ELECTRICAL REVIEW

[ILLUSTRATED.]

A WEEKLY JOURNAL OF

ELECTRIC LIGHT, TELEPHONE, TELEGRAPH AND SCIENTIFIC PROGRESS.

(Formerly Review of Telegraph and Telephone.)

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Window and Door Electric Alarms.

The Steiner window spring is a reliable and cheap burglar-alarm window connection, which fills a long felt want inthat it is reliable and cheap.

The Steiner door springis a burglar alarm door connection which, besides being cheap and reliable, possesses the additional merit of being very easily and quickly put in place. Instead of making a place for it with bit, chisel, etc., as in the case of styles now in use, it is only necessary to use one size of bit twice. An electric bell-hanger will appreciate the saving of time and recognize the merit of this ingenious invention. These are illustrated in this issue and are manufactured by Western Electric Company.

The Electric Lighting of Lighthouses.

The great utility of the illumination of the coasts, both on account of the security of navigators and for the development of the maritime power of the country, has, writes M. Felix Lucas in *Comptes Rendus*, for a long time attracted the attention of engineers and physicists, and has justly excited their emulation in search of improvements. More than any other nation France has contributed to the successive improvement of the appliances for lighting up lighthouses. For the last twenty-five years the discoveries made in the department of electricity have opened up a new field of research.

The lighthouses on the coast of France at present illuminated by the arc light are those of Dunkerque, Calais, Gris-Nez, La Cauche, La Heve, the Baleines and Palmyre. A great number of other lighthouses of the first rank at present lighted with petroleum are about to be converted into electric lighthouses.

In a memoir on "Magneto Electric Machines and the Voltaic Arc in Lighthouses," inserted in July, 1855, in the *Annales des Ponts et Chaussees*, I indicated the laws and the working conditions of these appliances. We employ in all a force of 4 horse-power to produce 450 Carcel burners, thus obtaining 112 Carcels per horse-power. As the electric current is 55 amperes and the resistance of the arc 0.43 ohm, the difference of potential between the two carbon points is 23.65 volts and the electric energy amounts to 1,300 watts. Hence, for the 4 horse-power employed, the arc absorbs only 1.76 horse power, the rest is expended on the transmission of power by belting, the rotation of the magneto-electric machine, the internal energy of this machine, and the external current corresponding to the transmission from the machine to the arc.

In fine, the voltaic arc presents, compared with petroleum lamps, two advantages of the first order for use in lighthouses—that is to say, the luminous power and the diminution of the cost of the unit of light. But it is, unfortunately, open to some criticisms, the chief of which relates to the capricious instability of its light. If we observe attentively one of these powerful foci, we perceive at once that the great light does not come from the blue flame, which, properly speaking, constitutes the voltaic arc. It comes from the points of carbon raised to incandescence by the enormous elevation of their temperature. The flame of the arc is rather a screen than a focus. It absorbs more light than it gives out. The unsteadiness of the light noticed is due, not so much to the variation in the mean difference of the points, as to the continual displacement of this screen around the carbon, and the capricious and continual rotation of the incandescent zones around the points. This defect is so inherent in the very nature of the voltaic arc that its complete removal seems unattainable.

But as soon as it is incandescence, and not the combustion or the transfer of the particles of carbon from one pole to the other, which constitutes the main cause of the light, cannot we expect incandesdence in a vacuum to furnish a focus as powerful as the voltaic light? It seems to me that in this direction must be sought the future solution of the problem of the electric lighting of lighthouses, and I have for some months studied in this direction.

The conditions which I have imposed upon myself, by reason of the very nature of the object sought, are the following:

1. The luminous focus must present the form of a surface of rotation having a vertical axis, for the light must be equally distributed in all azimuths.

2. We must have recourse to currents of quantity, and to an incandescent body of low resistance, obtaining many watts with few volts, so as to give power to the luminous focus without producing at the same time a lightning-like or even dangerous tension.

8. The incandeseent body can only be of carbon, because it is the only substance which can support excessive temperatures without fusion or volatilization.

In a memoir inserted in the *Comptes Rendus* of June 8th, 1885, I made known the law which links the luminous intensities to those of the currents traversing an incandescent carbon. We may obtain 400 carcels with a current of 170 amperes and a resistance (of the incandescent body) of 0.04 ohm, or, in other terms, with a tension of 7 volts and an energy of 1,200 watts. In these conditions the luminous unit does not require, for the incandescent part of the circuit, a mechanical work greater than what it requires at present with the use of the voltaic arc. I have estimated the temperature of the luminous carbon at about 4,000° C., and I have found that the carbon is neither melted nor volatilized.

We know that in incandescent lamps there is produced in course of time a carbonaceous deposit upon the inner surface of the glass globe. This gradual decrease of transparence would be especially injurious for powerful incandescence foci. I have endeavored to determine the true cause, and my experiments prove that it consists in the presence of molecules of oxygen within the lamp. We find, in fact, that the rate of increase of the deposit is in direct relation with the pressure of the internal gas. We should arrive at an infinite slowness, or, in other words, at the cessation of the deposits if we could obtain and preserve an absolute vacuum within the glass globe. A molecule of oxygen not removed combines with the carbon near its junction with the metallic conductor a region in which the temperature cannot reach the melting point of the conductor. There is thus formed a molecule of carbonic oxide. This molecule, then, coming in contact with the incandescent portion, the temperature of which is high enough to produce dissociation, projects the carbon against the inner surface of the glass globe and leaves the oxygen at liberty to combine again.

The realization of an absolute vacuum in an incandescent lamp is rendered particularly difficult by the tenacity with which carbons and metals retain the gases which they have stored up in their pores. Under the influence of the rise of temperature caused by the passage of the electric current, these gases escape at first to a great extent, but the liberation soon becomes so slow that we seem in presence of a phenomenon obeying an asymptotic loss. This loss, which I have clearly established, shows that every apparatus intended to produce the incandescent light on a large scale must be furnished with an absorber capable of constantly storing up, at every point of time in the working of the lamp, the gases which escape in slight quantities from the heated carbons and metals.

It must be remarked, on the other hand, that the gases liberated during the passage of the current and not removed from the apparatus are re-absorbed by the carbons when they become cold. In consequence the presence of a small quantity of gas in an incandescent lamp compels the carbons to periodic disengagements and reabsorptions. Hence a mechanical work is imposed on its molecules, which is one of the principal causes of the destruction, sooner or later, of the lamp. To give a powerful incandescent lamp the conditions requisite for lasting, it must be freed from the dangerous influence of even the most rarified gases. I have found that this difficulty may be overcome by the use of absorbent appliances.

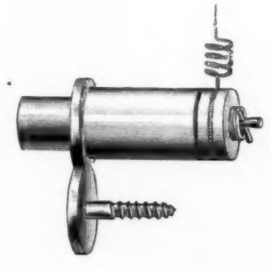

FIG. 1.—STEINER ELECTRIC DOOR SPRING.

FIG. 2.—STEINER ELECTRIC WINDOW SPRING.

The Sympathetic Telephone.

The following very pretty fairy tale is given by a San Francisco correspondent who has recently returned from a year's sojourn in Europe

Last summer, during a sojourn of a few weeks among the Alps, in Switzerland, I was one day belated while descending toward my hotel, and concluded to try to find a place to pass the night. In a secluded nook, between two hills, I saw three or four small but neat houses, and concluded to apply for a night's lodging. At the door of the second house at which I made application I was met by an intelligent, thoughtful-looking man, some 40 or 45 years of age, who told me I was welcome to share his plain fare.

After a simple but much relished supper, we sat talking on various subjects until the clock struck 8, when my host suddenly asked me to excuse him for a short time. He went into an adjoining room, remained there a few minutes, and then returned. On comparing my watch with his clock, I asked him if his time was not rather slow. He replied that it was; that he kept it with Blackburn (England) time, where a friend of his was living. On asking him why he kept that time, he rather reluctantly let me into the secret of a great discovery of his, which he called the sympathetic telephone. He told me that at 8 A.M. and 8 P.M. each day he went to his telephone and conversed with his friend in Blackburn, learning the latest news in England. They had mutually agreed upon those hours, as they had no system of calls, and so had to be on time at certain hours. He explained his discovery, as nearly as I can remember, as follows:

He had discovered, after many experiments, that magneto electricity differed in its nature with the different impurities or ingredients in the steel of the magnet for generating it. By making the telephone magnets of bars of cast steel, and mixing different metals with the steel or different grades of the same metal with it, currents of electricity of different natures and properties could be produced, and that his telephone was based upon this principle, and that he was enabled to do without continuous connecting wires between the two distant telephones. His telephone and its mate at Blackburn were made as follows:

The magnets were made of cast steel, with a small per cent. of a certain metal, which was a secret, thoroughly mixed while melted with the steel. The bar, not straight, but of a peculiar form, was so made that when cut in two the two pieces were as nearly alike as it was possible to make them. After these two bars were magnetized, they were used in the construction of two telephones, made as nearly alike as it was possible to make them. The diaphragms of these telephones, however, differed from those generally used, both in the material and manner of fixing them near one of the magnetic poles. The short conducting wires (extending a few feet below the surface of the earth) are made of two wires of different metals, twisted together, and for the two telephones, composing the pair, are exactly alike, being originally in one piece, and afterward cut into two pieces of equal length for one pole, and two corresponding wires for the other pole are made like the first, except the metals are different.

When the two telephones are completed, they are taken to the two places between which communication is to be had, and in each instrument both wires have a ground connection established. In the telephones, the action is as follows :

Speaking in one telephone causes the diaphragm to vibrate, which causes a current of sympathetic electricity to be generated. This passes along the wire into the ground, but does not return on the other wire of the same instrument, passing through or along the earth, as is usually done along an insulated wire—or, perhaps, more properly speaking, displacing the particles of electricity successively along its route, it seeks—and finds—its corresponding wire at the distant place where the other instrument is located, and, passing along this wire into the telephone (the mate of the first) vibrates the diaphragm, producing the corresponding sound to that spoken into the first one. The current then passes along the other wire into the earth, and back to the first telephone, thus completing the circuit. The sound thus produced is weaker than that in the common form of telephone, but, by an amplifying arrangement, it is made quite distinct and clear, as I found out the next morning, when I was permitted to test it, by talking direct to the friend of my host, in Blackburn.

The sympathetic telephone, constructed and connected as above, will give no sound to, or receive any from, any other telephone that is not made exactly like it. Probably if three or four were made exactly alike each one could communicate with all the others. My host told me they had not yet been able to use any call bells, as the kind of electricity used in them would not take the course taken by the sympathetic current, but he hoped to overcome this difficulty before long, as he was now experimenting in that direction.

The distance to Blackburn, in a direct line, is about 800 miles, and as it works as well at that distance as it does between places only two or three miles apart, it is supposed it will work well at any distance.

My host made me promise not to divulge his name or locality, as he wished to perfect his discoveries and inventions before the public should be informed of them, as he would be troubled by too many visitors. He declared quite positively that if he could bring it to perfection he would, on the receipt of a few thousand dollars to repay him for his time, trouble and expense, give the discovery (or invention) to the public, which would effectually break the present gigantic monopoly.

—— Plans for lighting the city of Detroit have been prepared, and are said to be in accordance with the present tower methods in use there. There is no change from the system now in use, only considerably more of it. The plans call for thirty more towers and forty-eight more pole lights, making a total of 122 towers and 77 pole lights. Plans for lighting the city by gas and naphtha are also in progress of preparation by the controller.

The Burnham Engine.

The illustrations on pages 2 and 3 will give our readers an excellent idea of the Burnham self-oiling, automatic engine. The offices of the promotors of this engine are at York, Pa., and a new illustrated catalogue will be sent to all who desire full information concerning its features. The Burnham engine is the invention of an engineer who has devoted many years to devising plans for a fast-running, self-oiling, automatic engine, of simple and compact construction, to use steam economically, which could be run in the same room with other machinery without causing damage by steam or vapor. The first engine made of this invention was run two months and thoroughly tested by all conceivable means as to its power, durability and steady running, and when taken apart for examination all of its parts were found as perfect as when first put to work. The second engine made was changed in appearance and put to work in the Novelties Exhibition at Philadelphia Pa., driving an incandescent dynamo, and run every day the exhibition was open (six weeks) from 10 A. M. to 10 P. M., and at the close of the exhibition was awarded the high premium of a silver medal and diploma. While this engine was on exhibition several offers were made to buy it at the price now asked for the same size, but an offer of three times its price would not have been accepted, as the inventor had not then filed in the Patent Office all his applications for patents for several inventions which were not on the engine exhibited, but are now patented and put on all engines offered for sale.

This engine is self-oiling, this being accomplished by wool or cotton, placed in large stationary cups, and saturated with oil, which oil is slowly conveyed to the running parts of the engine through loose wicks in tubes. The casing prevents the oil from getting outside, and deposits it, after being used, in the bottom of the casing, so that it can be used again, or removed, as may be desired. The ventilation at each end of the casing admits cold air to working parts of the engine, and the heat of the cylinder causes the air to ascend and pass out at the upper end of the ventilators. The number of pieces constituting this engine are few comparatively, and are so constructed that the fitting of each piece is done accurately by machinery to standard gauges. The crank-shaft and all other wrought material used, except connecting rod, are made of steel.

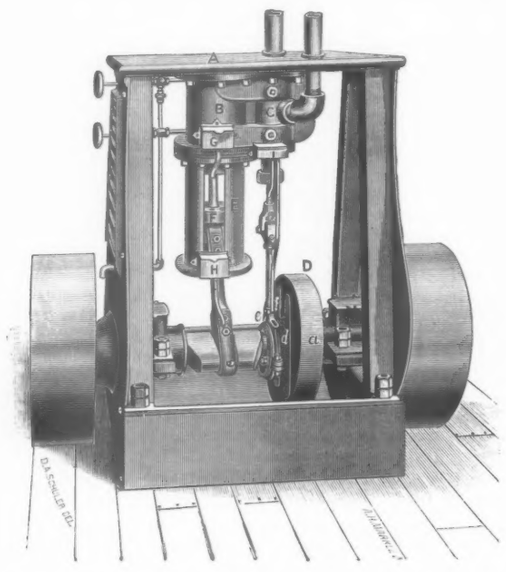

FIG. 2.—SINGLE CYLINDER BURNHAM ENGINE—FRONT REMOVED.

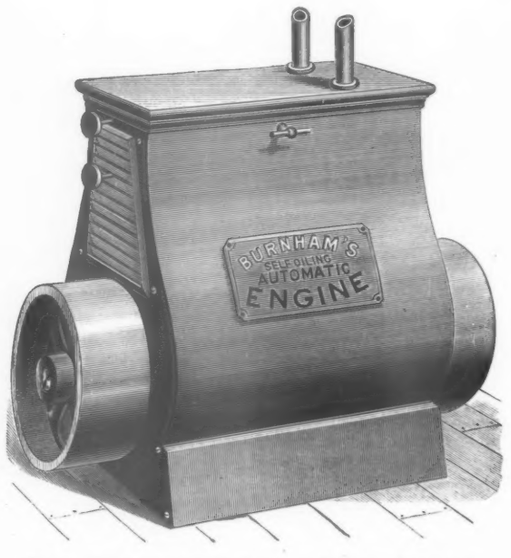

FIG. 1.—SINGLE CYLINDER BURNHAM ENGINE.—COMPLETE.

Mr. W. H. Preece on the Telephone *cum* Telegraph System.

The following correspondence is of interest to many of our readers, and will explain itself :

121 CHURCH ST, TORONTO,
Nov. 23d, 1885.

W. H. Preece, Esq., F. R. S.

DEAR SIR,—I am led to belivee that a misconception exists on the part of some in America with regard to your position on the question of the simultaneous transmission of telephonic and telegraphic messages on the same wires; and I write to ask you if you will kindly give me authority to correct said misconception, if your views have been misunderstood, or if they have been modified since you were in this country in 1884.

You are reported to have made the unqualified statement that the simultaneous transmission was impractical, because the telephone equipment caused retardation in the speed of the telegraphic signals. Now, I am persuaded that your remarks had reference to your experiments with the telephone on the wires of the Post-Office Department, where the Rapid Automatic Telegraph system is used, and that said remarks had no reference to the use of the telephone in connection with the ordinary Morse system.

If I am correct in this conjecture, will you please write me to that effect, so that no injustice may be done to a system which, we find, causes neither retardation of nor interference with the telegraph signals, when used on the Morse wires, and which appears to have a wide field of usefulness, more particularly in permitting telegraph wires to be used as telephone trunk lines for connecting distant telephone exchanges.

You are, of course, aware that Van Rysselberghe is using the system extensively in Belgium, and no doubt you have already seen somett ing of its practical operation.

Awaiting an early reply, I am, yours truly,
A. M. ROSEBRUGH.

POST-OFFICE, LONDON,
Dec. 15th, 1885.

DEAR SIR,—I have to thank you for your letter of November 23d, with reference to the Van Rysselberghe system of telephones *cum* telegraphs.

My opinion had reference to Wheatstone automatic working only.*

Yours faithfully, W. H. PREECE.

A. M. ROSEBURGH, M. D., 121 Church street, Toronto.

*** Mr. R. E. Hulton, of the Northern Telephone Company, England, states that in his district the weather during the past ten days has been of a totally unexampled description. "The oldest inhabitant," even with the aid of his usually elastic imagination, is unable to grapple with the occasion, and can rake nothing out of the dusty corners of his memory of the bad old times that will at all compare with the present state of things. It is perhaps early to boast yet, he says; but with about three feet of snow on the ground it is probable that the worst of it is over, and therefore it is very satisfactory and reassuring to the managerial mind to have no reports of broken wires, even on the trunk routes, where the wires are exposed to the full strength of the storm. The snow came at a very unfortunate time, as there are several important trunk lines under construction at present, and it is very necessary to get the link between Sunderland and Hartlepool complete with as little delay as possible, while the trunk between Hartlepool and Stockton is nearly completed.

*With the Wheatstone automatic system, here referred to, very rapid alternating currents are used, and with a single electro-magnet (the receiver) in circuit. The addition of a second electro-magnet causes retardation of the current, which is practically a telephone current with about 5,000 vibrations per minute; hence the addition of the electro-magnets of the telephone system becomes inadmissible. With the Morse system, as is well known, the case is very different. The addition of an electro-magnet of, say, 150 ohms, at each end of the line does not cause the least retardation of the telegraph signals. Indeed, the telephonic equipment so completely suppresses induction that the working capacity of parallel wires is improved, as well as the wire or wires so equipped.

Electric Light Passing Through Colored Glass Produces a Quaint Effect.

One of themost striking of the gorgeous stage pictures in the new opera of Orpheus and Eurydice, that the American opera company produced at the academy, is the spectacle of the infernal regions, in the second act. Orpheus stands with his golden lyre right on the verge of the bottomless pit, a figure bathed in radiant white light. Below him, on all sides, clothed in red and lurid in the glare of the red light, crouch the host of demons that he subdues with his lyre and song. Two skulls, with fire glowing within them, lie at Orpheus' feet as he sings, and suddenly as his song ceases and he descends among the furies to seek his lovely consort Eurydice, the bottomless pit on the verge of which he sang, kindles and sulphurous smoke seems to ascend toward the dome of the theater. It rises in ever-changing fantastic clouds, sometimes blue, sometimes green and sometimes black. At times all three hues are intermingled vividly. The smoke puzzled the audience the first night.

A reporter went behind the scenes to get a closer look at it. There it looked quite as natural as it did from the body of the theater. It ascends to the flies and then mysteriously disappeared.

"What sort of smoke is that, anyhow?" the reporter asked the Stage Manager, Charles Hock.

"Smoke! that isn't smoke at all," Mr. Hock said, with a laugh, "that's a new stage illusion that was brought over from Germany. What seems to be smoke is only electric light passing through colored glass. It is a new use to put electric light to and this effect is one of the many surprising ones that can be produced by its agency."

"How do you send the light through the glass?"

"Ah! that's just the secret that I can't tell you, and, what's more, nobody else will be able to find out, either," and Manager Hock pointed illustratively to the rear of the stage, where the whole apparatus was boxed up so that nobody but the man who worked the light could possibly see how the light was worked.

"There are some bits of strange realism," Manager Hock added, reflectively, "that it would be a pity to destroy by explanatory revelation. This is just one of these bits."

The Electric Light at Sea.

The danger to which great ocean steamships, going at a rate of from eighteen to twenty miles an hour through coast waters full of all sorts of craft, are exposed, has just been strikingly illustrated, and to obviate this danger it is proposed that they should steam slower in approaching port. But every step in the evolution of the modern passenger steamer shows the impracticability of such a measure. Speed has been more and more insisted upon by the traveling public for years. The favorites in all the lines are the fastest boats. The main question for most people who go abroad is which steamer can make the quickest passage from port to port. The companies have increased the size and added to the comforts and luxuries of their vessels until they are floating hotels, while the speed attained by the newest models is so great as to be incompatible with safety under the old system of precautions. The Oregon was lost because an approaching schooner was not seen in time to avoid her. The inference is that on a dark night the ordinary lookout is no guarantee against fatal disasters.

But neither the traveling public nor the owners of these steamers are at the mercy of darkness. Modern science furnishes in the electric light a sufficient protection against such collisions as that of the Oregon and the unknown schooner. The navies of Europe have long since introduced the electric search-light as a means of protection for ironclads against night attacks, and the experiments made show that in dark but clear weather this light will discover any object moving on the water a mile from the vessel making the search. The electric search-light is so arranged as to revolve. It is thrown all round the vessel, and in such weather as prevailed when the Oregon was run into it would unquestionably prove effective in giving timely warning of the approach of any vessel. There would be little trouble in applying it to passenger steamers, all of which already employ electricity for lighting the saloons and staterooms. The search-light would probably be less efficient in foggy weather, but in fogs even "ocean greyhounds" are not expected to be run at full speed and at such times extra vigilance is sure to be exercised.

The only wonder is that the use of the electric search-light on passenger steamers has not been adopted before. They are not less in need of protection than men-of-war, for a comparatively small obstruction may wreck a vessel going at a high rate of speed, as the event has shown, and the length of the modern steamer is so great that she must have plenty of space to turn in after an approaching vessel has been sighted. A sailor's vision is usually strong and sharp, but there are plenty of nights when, even in the absence of fog, he cannot see more than a ship's length in any direction; and no matter how vigilant a lookout may be under such conditions, it cannot be effective. The search light, however, assures the safety of the vessel in merely dark nights, and its adoption is clearly in the line of necessary precautions. If to this improvement is added a supply of a couple or more of roomy steam launches for use in case of a disaster at sea, the traveling public would have much less cause for uneasiness. The electric light alone would render impossible such catastrophes as that which has just occurred.—*New York Tribune.*

.... Congressman Anderson's resolution to investigate the monopoly of telegraph companies, which was adopted by the house, is now being considered Representatives of the Western Union on one side, and of the Baltimore and Ohio and the United Lines on the other, are already on the ground and making preparations to appear before the committee. The probabilities are that this investigation will take wider scope than any inquiry heretofore made by Congress into the subject.

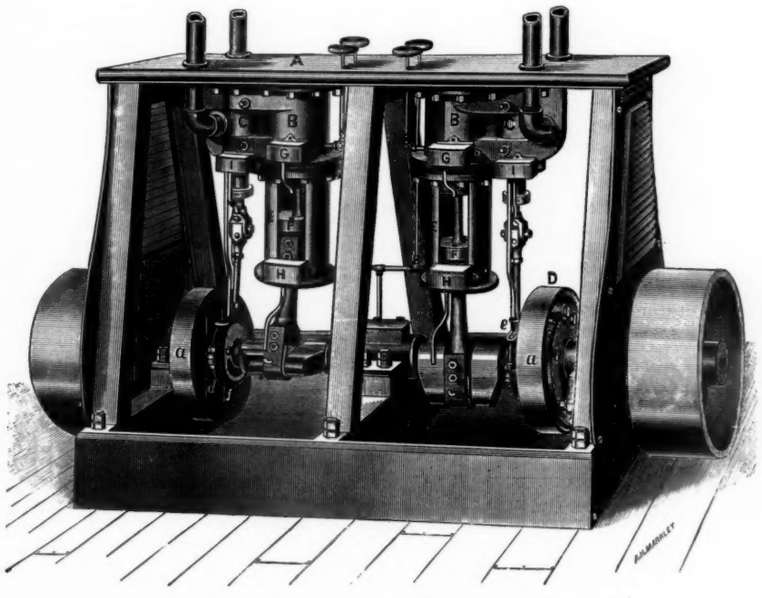

FIG. 3.—DOUBLE CYLINDER BURNHAM ENGINE.

Indianapolis Council on the Telephone Withdrawal.

At the meeting of the city council of Indianapolis, last week, Mr. Cummings presented the following:

WHEREAS, The Supreme Court of Indiana has decided that the law fixing the compensation of the Bell Telephone Company is constitutional, etc.,

Resolved, That notice be served upon the officers of the said Bell Telephone Company at once that whenever they discontinue any of their instruments that are now in use by those who desire to continue them, and who have complied with the regular conditions and paid the legal rates, as established by law, or fail promptly to put in new instruments when regularly applied for, that the said telephone company will require forthwith to remove all their poles and wires from the streets and alleys of the city of Indianapolis.

Mr. Swain offered the following as a substitute:

WHEREAS, The Central Union Telephone Company of this city have elected to terminate the service and remove from its patrons over 500 of its instruments on March 31, 1886, and,

WHEREAS, Said telephone company contemplate keeping the territory within the city limits for at least six months longer, therefore, be it

Resolved, That the City Attorney be and is hereby instructed to state to this body at its next meeting if, in his opinion, said telephone company can legally remove its instruments as contemplated, where parties comply with the requirements of the law, and when said company have not as yet declared their purpose to quit said territory at any definite time.

Mr. Pearson remarked it would take an ordinance to remove the poles and wires, and it would be well to go slow. He moved to refer the matter to the judiciary committee, with instructions to report at the next meeting, and this motion prevailed.

*** Wires of telephone and telegraph companies are often complained of by firemen, on account of the obstacle they present to the working of ladders. A case is recorded, however, where nine firemen were thankful for the presence of the wires. The men were on an extension-ladder, fifty feet from the ground, when it swayed, and they would have been dashed to pieces but for a telegraph pole and wires which caught the ladder and prevented a disaster.

An Important Development in the "Air Telegraph."

Editors Electrical Review:

As is well known during the past two weeks, the projectors of the new Edison Railway Telegraph have been experimenting with their apparatus along the line of the C. M. & St. P. R. R, on the division extending from Chicago to Milwaukee. At the time these experiments began a new "induction" was reported by the toll operators and chief operator of the Milwaukee Telephone Exchange. Investigating this I found that a peculiar buzzing noise was distinctly audible, and very soon realized that it represented the dots and dashes of the Morse alphabet, and was soon able to read train orders and parts of messages. Following up this investigation I find that, at any time the railway telegraph is going on, we are able, by listening at our telephones, to read messages transmitted to or from the moving trains. This effect is most noticeable on a toll line which runs in a parallel with the railway, and not nearer than 100 yards of it at any point, this parallel line extending a distance of about ten (10) miles south of Milwaukee. It is also noticed that on a dry day the sound is almost audible on almost any line more than one-half a mile in length connected with the Milwaukee Telephone Exchange. It will thus be seen that effects are induced from one wire on to another throughout the Exchange. The noise, fortunately, is not very loud, and does not interfere with telephoning. It does, however, materially interfere with the secrecy of the railway telegraphing, as an expert Morse operator, with a telephone at his ear, will be able to take off any and all messages sent by the new Edison system. The writer would be pleased to know if similar effects have been noticed from the Phelps system of railway telegraphing. The railway officials, and others connected with the new telegraph system, have been much astonished to learn of the effects produced on telephone lines.

Yours truly,

A. S. HIBBARD.

Milwaukee, March 16, 1886.

*** At the annual meeting of the Bell Telephone Company, of Buffalo, the following board of directors were chosen: Joseph Churchyard, Samuel H. Cowles, Edward J. Hall, Edward J. Hall, Jr., James McCredie, Robert S. Boyd, Harlow C. Palmer, Sherman S. Rogers, Henry Altman, Theodore N. Vail, Henry M. Watson, Wm. H. Watson, John L. Williams. The officers for the ensuing year are: Henry M. Watson, president; Edward J. Hall, vice-president; Harlow C. Palmer, secretary and treasurer. Mr. Cowles tendered his resignation as general manager of the company, which was accepted, and the following resolution adopted:

Resolved, that the resignation of S. H. Cowles as general manager be accepted, to take effect the first day of March, and that the directors tender to him their thanks for the faithful manner in which he has performed the duties of his position, and express their best wishes for continued success in his new field of labor.

No definite arrangements have yet been made to fill the vacancy. Mr. Cowles has been connected with the Bell Telephone Company for seven years, covering the entire period of the organization of the company, with the exception of the first two months, and retires from the company for the purpose of taking an active part in the firm of Gies & Co., with which he has for some time been interested and of which he has been a director. He was an excellent officer and first-class telephone manager.

—— An electric lighting plant is to be established at Camden, Me., by A. W. Hart, of Waterville.

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We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

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Lieutenant Thomas M. Woodruff, of the United States Signal Service, was in New Bedford last Friday. He laid the cable portion of the Martha's Vineyard and Nantucket signal service last fall, and will now begin on the land portions, which he expects to finish in four weeks. Beginning at the Western Union telegraph office at Wood's Hall, a line will extend to Long Neck, with a Station at the Fish Commission building.

We are informed Mr. W. H. Lawrence has purchased the interest of Mr. W. H. Boulton in the Boulton Carbon Company, Cleveland, Ohio. Mr. Lawrence is not an entire stranger to the electric lighting people. He will be remembered as the general superintendent of the old Electrical Supply Company, which afterward became the Brush Electric Company, of which Mr. Lawrence was a large owner, and general superintendent until about four years ago. The manufacturing department of the Boulton Company is being entirely reorganized and improved in all its departments. With their improved methods and processes, they expect to give the electric lighting people a perfect carbon.

The decision in the New Orleans telephone case will be awaited with considerable interest by the Bell and opposition companies. It is an important suit, and both sides have marshalled their full strength. The case is now in the hands of the court.

The chief complaint heard from parent electric light companies is their inability to turn out new apparatus as fast as ordered. Several companies are compelled to enlarge their facilities. The demand for electrical apparatus is apparently continually growing, and the public is becoming more and more alive to the value of electricity in its various effective fields.

There have been a number of prominent Western telegraph men in New York recently, among them Mr. J. J. Dickey, of Omaha, and Mr. E. L. Martin and Mr. Geo. M. Meyers, of Kansas City, Mo. Mr. Dickey, who has entire charge of the telegraph lines of the extensive Union Pacific system and is also division superintendent for the Western Union, is one of the strong, practical men in the business, whose splendid work has given him a wide reputation in telegraphic circles. Messrs. Martin and Meyers are interested in the financial and practical branches respectively of the Pacific Mutual Telegraph Company, a Western corporation that is now a recognized factor in the telegraphic circles of the West, and which is connected for business purposes with the United Lines and B. and O. Companies. The Pacific Mutual will probably be extended from Kansas City to Denver during the summer.

Mr. A. S. Hibbard, superintendent of the Wisconsin Telephone Company, presents in this issue an interesting and important result of the recent experiments with the "Air Telegraph." It seems that the messages, once let loose from the roof of the car, disseminated miscellaneously over the State of Wisconsin, particularly making themselves known on the telephone wires in Milwaukee and vicinity. These could easily be read by telegraph operators listening at any convenient telephone. While induction in this case has been put to new and surprising uses, it does not seem to be so perfectly harnessed and controlled as to secure the secrecy that is an imperative essential in telegraphy. The new features in its diffusion, reported by Mr. Hibbard, are worthy of careful investigation.

The Washington *Post* says: "Mr. Thomas A. Edison, the inventor, has filed an application for a patent for his invention of telegraphing from a moving train. Last October, not quite six months ago, a man named Lucius J. Phelps, of New York, obtained quietly from the Patent Office, and without any newspaper notoriety, a patent for telegraphing from a train by induction. His method is not quite the same as Mr. Edison's, for the latter telegraphs from the roof of the car to wires upon a pole, while Mr. Phelps proposes to lay a wire along the track between two rails and telegraph from the bottom of the car. The principle, however, is the same, and is broadly covered by Mr. Phelps' patent." Mr. Phelps' system is in practical use, and has been for several months. The earliest patent in this line of invention was granted, however, to Mr. W. W. Smith, in 1880, we believe, and is now controlled by the Edison company. This patent will, no doubt, be the chief reliance of this company in contesting prior rights with the strong patents owned by the Phelps Induction Telegraph Company. Mr. W. L. Silvey, of Cincinnati, also claims an early patent on this apparatus, issued July 12, 1883. He says that he worked out his invention on a farm in Indiana, rigging up wires in his father's orchard and telegraphing from one wire to another forty feet apart. Silvey thinks that his apparatus is superior in that his produces sounds that are audible in a room, while Edison uses a telephone receiver to hear distinctly. One year after his first patent he patented an improved receiver, which still further increases its availability.

LIGHTING THE ELEVATED ROADS' TRAINS.

A New York daily paper, which is inimical to Mr. Cyrus Field, informs its readers that he has a plan on hand to light up the trains on the New York Elevated Railroad by electricity. Unable to forget its old grudge against Mr. Field, it leads it readers to believe that he has a man silently at work on the problem, and proposes to use his influence and power with the elevated roads to make money out of the scheme. Now every well-informed man, except the writer of that article and a few marines down at the Navy Yard, is aware that, if there is any man secretly at work on this alleged problem in Mr. Field's building in Bowling Green, he is wasting his time and his employer's money, for there is no problem about the matter at all, the lighting of trains in the manner proposed having been designed and put into experimental practice several years ago both here and abroad. Two years ago, on the London, Chatham and Dover Railway and more recently on the Great Northern Railway, trains run for months at a time; those on the first fitted with secondary batteries, reinforced by dynamos coupled up with the axles of the cars, and those on the last-named road lighted by electrical energy, generated by a small engine and dynamo set up on the locomotive.

As to Mr. Field's private plans and intentions we do not pretend to speak, for in truth, they don't interest us, but as to the project of lighting the trains on the Elevated Roads with electricity, we know that it has been under consideration a long while, and that quite recently arrangements have been undertaken looking to a practical trial of the system in the near future. The only thing worthy of remark about this scheme is that it was not long since carried out.

Any electrician who has given a thought to the matter and is aware of the favorable conditions which prevail on these elevated roads for a system of electrical lighting of trains, must have wondered that the old style of oil lamp with all its attendant annoyances of unsteadiness, flickering and bad smells, should be tolerated.

The writer of the article in last Sunday's paper to which we have referred, says that the electric railway companies of New York City have $70,000,000 worth of oil lamps. Now, if he made this discovery on the preceding night, that is Saturday night, we must beg leave to doubt its accuracy. Perhaps the coming philosopher will tell us why figures set down on Saturday night are usually exaggerated. Is it because of a greater rarifaction, or a greater comparative humidity of the air on that night that makes the writer incline to a doubleness of view? Perhaps, when he says the elevated roads have $70,000,000 worth of oil lamps, he includes some of the rolling stock and roadbed. But whether they have or have not so much capital invested in oil lamps, it is more than likely when once they try electric lighting they will discard them.

In any other system of railroads we would not advise the use of electric lighting as yet, not until some means has been found—and it certainly will be before long—of making each car's lights independent of those in its neighbor. But the elevated railway's trains are never broken, or, if they are, there is no necessity for it. A train of four cars on these roads is, to all intents and practically, one long car fitted with joints. Hence it is that the one defect, the one obstacle to the use long since of the electric light on many roads, or rather upon certain trains of many roads, has been the trouble experienced in making and breaking up trains.

The elevated trains should be electrically lighted without delay.

Ohio has a $3 per month telephone bill, but it is not likely to be enacted.

The Metropolitan Telephone and Telegraph Company has bought the property 16 and 20 Cortlandt street, in New York, for $157,500.

GENERAL WESTERN NEWS.

In a letter from Rochester, Minn., a newspaper correspondent, speaking of the "Pan-Electric," which is raising so much clatter now-a-day: "Is the prefix in honor of the noisy kitchen utensil of that name, or of the tooting god of the pipers with the goat's hind legs—patron of shepherds—or is it, as, alas! I fear it is, only meant to stand for the Greek word *all?*" In a stage representation at Buffalo, a short time since, a pan-electric instrument was shown, the apparatus plainly indicating, if this was a genuine instrument, what the *pan* part signifies. This one had decidedly culinary proclivities. The magneto bells were quart tin pans, the induction coil a potato masher, the magneto a coffee mill, and both the receiver and transmitter were tin funnels on sections of garden hose. When the crank was turned, it rang a Chinese dinner gong. This was Matt Buell's pan-electric telephone—differing from the former in having more pan and less electric, but probably equally as valuable for all present purposes.

One of the direct results of the evacuation of the Indiana field by the telephone companies is the discontinuance of the fire alarm system, which, in many cases, was telephonic. In Evansville, for instance, says a newspaper, the telephone exchange was their only refuge in case of fire. The withdrawal of the telephone company leaves them in a bad shape, from which their only remedy seems to be to adopt some system, etc. This is all well enough save as to Evansville. That burgh may have been in the habit of using the telephone to some extent for fire-alarm purposes, but the city has had the Gamewell system in service some nine years, and has at present some forty alarm boxes of that system.

There is, it might have been said a while ago, within a few miles of this city, an electric light station in which there nightly buzzes a 60-light machine. In the same town there whizzes another, run by an opposition company. The enormous rental of $5 per month is charged for an arc light, and the 60-light buzzer has made for its stockholders money enough in the past year to nearly rebuild the plant. With no debts, at a settlement the other day it had money in the treasury. The two plants are united under one control now.

There was a time when the buzzer would only run 28 lights with 1,800 lbs. of coal per night, with 180 revolutions of the engine. The line, as remarked above, was put in order, and the buzzer, deeply in debt, set to work again. The speed of the engine was run up to 280, and the 60-light buzzer, on 1,800 lbs. of coal, is—or was, regularly, a short time since—running 68 good lights, which were perfectly satisfactory to the rent-payers, and the dynamo and engine run cool. And the buzzer man is cooler than either engine or dynamo. He says he is ready to demonstrate that that same 60-light machine, without alteration, can be made to run 100 good lights with perfect safety to engine, machine, lamps, and the what-you-may-call-'em electrician. He says the electricians say that electricity lies—but he has come to the conclusion that the liar in the case is more tangible than the current.

The attention of Brother Weeks is respectfully called to the above statements in the hope of assisting any statistical work he may have on hand. The 60-light buzzer man says he has demonstrated that $4 per month for twelve o'clock lights, paid to a properly-managed company, will make money for the stockholders.

In Iowa the action of the Indiana telephone companies has proven a "scare cat." There is a bill before the Iowa solons regulating the telephone charges at $36, on the same basis as the Indiana enactment; and through fear, as the papers have it, this law is to be indefinitely shelved by postponement. Iowa is not pursuing a policy which is eminently satisfactory to the enemy, who howl about water in the stock of the local companies, fraud on the people, outrages against the dear public, and all that sort of thing.

'Oh! give me a bite of your apple, Bill,"
Says the big boy to the small.
"If you don't divide on the square, my boy,
By golly! I'll gobble it all."

The National Telephone League, of Boston [limited, understood], is flooding Indianapolis with circulars calling attention to the existence of the league, and its determination to resist telephone monopoly at every point—that the action of the telephone monopoly in withdrawing is to improperly influence legislative action in other States, particularly in New York, Connecticut, New Jersey and Massachusetts.

Petitions, addressed to the U. S. Senate and the House of Representatives, asking investigation of the Hoosier State representatives at Washington to inquire whether telephone service by the Bell Company or its agents is to be discontinued, for the purpose of improperly influencing legislation in other States. The petitions are said to be not only extensively circulated, but quite generally signed.

The father of the Indiana law, Mr. Samuel B. Williams, for a person of only thirty-three, has been able to kick up considerable of a bobbery. Interviewed a few days since, the "chunks of wisdom" which fell from his lips would have crazed Capt. Cuttle, and probably driven Jack Bunsby into the sea.

Asked if the telephone companies would withdraw from the State, the solon replied: "In some localities they may, but I think they are playing a game of bluff. There is plenty of profit in the business at a monthly rental of $3, and, if the present companies withdraw, other telephone lines will soon be put up, so that Indiana will not be long without telephone service."

The Van Depoele Company are pushing railway matters for all there is in them. In addition to lines previously mentioned, they are now equipping the "Capitol City Street Railway" at Montgomery, Ala. Cars have been built specially for this company, which has about six miles of track. The overhead system—Van Depoele's—has been adopted, and the inventor is attending personally to the installation.

The Appleton Electric Street Railway Company, Appleton, Wis., is constructing a new line expressly adapted to the Van Depoele system. Cars are being specially constructed by the Pullman people for this road, and the entire plant will be especially well put up in every respect. Water power will be used to run the motors, and a large and convenient building is being constructed for the utilizing of that force through the medium of huge water wheels.

Probably the largest train of deadhead passengers which has pulled out of Chicago in some years left the Chicago, Milwaukee and St. Paul road on the 19th, at 10.30 A. M., for Milwaukee. Nearly 200 passengers—nearly all of whom had been invited, while the balance squeezed in—were to witness the novel telegraph system, called the Edison—which is principally W. W. Smith's—by which a newspaper man informed the writer "the battery jumped from the deck of the car—a distance of forty feet—and communicated to the wire!"

Something like a hundred of the passengers, who occupied the train of three coaches, a Pullman and an empty baggage car, are known to the fraternity as brass pounders, and all classes were represented, from the third assistant train-dispatcher up through manager, assistant superintendent, superintendent, general superintendent, in railroad or mercantile lines, and board of trade men with military and civic titles. Then there were telephone men, electric light fellows, inspectors, representatives of city governments, and, heaven support us, newspaper men, who know as much about electricity as—well, as they do about anything else, and the majority of whom were wise enough to write under instructions what they did say.

The office at Wadsworth was arranged to communicate with the train, in charge of C. B. Rudd. The car office was in charge of S. K. Dingle. The invitations which had been so generally distributed were contained in an envelope in companionship with two blanks, and a request that the recipient should write a message addressed to himself, which he should keep a duplicate copy of. The message would be sent and returned from Wadsworth, and comparison would, of course, tell the story and indorse the system.

Some hundreds of messages were sent in this way, and the two operators had full employment during the entire round trip between here and Milwaukee. Other messages, however, to Chicago, Milwaukee and other places were sent, in which case Wadsworth became a repeating station, the Western Union taking the work from that point.

During the up trip an experiment was made by A. S. Hibbard, superintendent of the Wisconsin Telephone Company, which resulted in still further mystifying the already muddled outsiders. One end of a number 25 B. & S. copper wire was attached to a bunch of keys to insure contact, and these were held down upon the brass plate over the truck, forming a good ground.

This wire was led through a telephone, thence parallel and attached to about thirty feet of the bell cord, the end being left unattached or open parallel to the roof.

Everything, both sent and received, could be read, by any operator who is educated in buzzer Morse, with that telephone as a receiver.

One who was not well up in this kind of sound reading was an attentive listener for some time, but could not hear a word—"not even a voice." He proved not to be an operator—not even an electrical plug in any department of the science.

Usually, on a train of this length, there is an important individual popularly known as the pea-nut fiend. He was evidently on somebody's list, and was not missed, as a rule. When the novelty had somewhat worn off—when we had dined at Milwaukee, and had settled down to enjoy a smoke and a ride proper—it seemed necessary that some substitute for a train boy was necessary. The necessity induced the aggregation which supplied the long-felt want. A firm started, and continued a brisk and thriving business all the way home. Think of it—eighty-five miles of chestnuts, old and fresher fruits, from such dealers as Swift, Tubbs, Wright, Beach, Haskins (Chicago) and Fred. Degenhart, with an audience of customers as large as that of a campaign speaker—and not half as quiet.

During the trip a mild-mannered reporter of a one-cent daily, having done himself proud, as he believed, discovered on the down trip that he had lost his notes, and he commenced in a feeble way to duplicate them. When this was partially done, a telegram was received announcing the finding of a package at a point where the train had stopped for a moment. We were nearly at Chicago, where the announcement reached him that his package would meet him by the Northwestern train at Pacific Junction. He received his package intact at the appointed time, but did not know until the next morning that he was the victim of a huge joke, and that the package had never been outside of another fellow's overcoat pocket.

Col. S. G. Lynch, broker at 144 La Salle street, gives the following as telephone share values:

Chicago	$375	@	$400
Central Union	49	@	51
Michigan	66	@	68
Great Southern	25	@	30
Iowa Union	15	@	18
Colorado	18	@	20
Rocky Mountain Bell	40	@	45
Missouri & Kansas	53	@	55
Missouri & Kansas, Script, 52 cents on the dollar.			
United	15	@	17
Cumberland	70	@	75
Wisconsin	110	@	112
Bell of Missouri	150	@	155

CHICAGO, March 22, 1886.

BOSTON ELECTRICAL NEWS.

A telephone employe happened in at an electric light station in this vicinity some time ago, and, after examining the apparatus and switch-boards, asked where their ground was. It was explained to him that electric lighting was done by complete metallic circuits, carefully insulated from the ground.

It is sometimes of advantage to use in certain experiments or measurements two or more cells of exactly the same electro-motive force. With all the care that may be used in setting up cells of the same type, great differences will be noticed. Prof. Dolbear, of Tufts College, has suggested and used a method which does away with this difficulty. He connects two cells in opposition, that is, zincs together, and carbons together. If the cells be of the same type, in a short time E. M. F. of both cells will be exactly the same. The stronger cell charges the weaker cell, a current flowing through the latter until the electrical pressure is equal in each

The Judkins Electric Railway Signal Co. have begun the work of equipping the entire passenger rolling-stock of the New York and New England railroads with their electric bell cord. The system will be placed in all Wagner, sleeping and parlor cars on this line.

Present indications point to the success of the attempt to form a company at Hyde Park to introduce arc-lights.

When the New England Telephone Co. made an equalization of rates for telephone there were some persons in a few sections who ordered their instruments to be taken out. This was only for a short time, for many ordered their instruments in again, and the fact that the increase in number of subscribers this spring is far in excess of the proportions of former years is an indication of the convenience and value of the present service.

There is an attempt now being made to have a bill reported to the Legislature to regulate telephone management in Massachusetts. A notice was recently sent to prominent subscribers by the New England Telephone Co. in Boston asking if they desired to have rates regulated by law, or if they are satisfied with the present service. The large number of answers immediately returned to the company showed that there is a very strong sentiment in favor of the present service. The replies in general expressed strong indication against legislative control.

The Municipal Signal Co. of Boston will at an early day place their police signal system in Station 6, South Boston district. In this system, the automatic watch clock, alarm and telephone systems are combined in such a way that the movements of patrolmen are automatically registered at the watch clock in the police station, and any calls for aid or any other cause are made known by the ringing of a bell at the same time that they are registered on the moving strip of paper. Both the alarm clock and register are connected in the same circuit. The apparatus used for this purpose is quite complete. The patrolmen can at any time signal the police station and, *vice versa*, the station can signal any or all patrolmen. An alarm can be given from outside without opening the door by a patrolman or other persons who may have keys. In case of necessity one can insert this special key and by turning it ring in an alarm at the police station. These keys are inserted in an opening at lower part of box, and when turned so as to give an alarm are firmly held, and cannot be removed until the door of the signal box is opened by a patrolman. As the special signal keys are all numbered, it is an easy matter to know who gave the alarm. The appearance of the appliances of the system is very neat and attractive. The Company's address is 53 State street. They have a branch office at 52 Broadway, New York.

The Sun Electric Company, of Woburn, Mass., have nearly ready for testing a dynamo of the flat ring type. Each of the two pole pieces is composed of three arms. The armature, resembling the Pacinotti type, is built up of pieces of thin sheet iron in separate segments, the sheets being electrically and magnetically insulated from one another. Any one of the four segments of the armature coils can be removed, and a coil easily rewound if there should be need for that. The field is in series and shunt so proportioned that the current will be constant under all changes of resistance and without outside mechanism for manipulating the brushes.

Frenyear & Razee, 352 Washington street, Boston, will soon publish complete catalogues of electrical supplies of all descriptions.

The Chemical Electrical Light and Power Company state that the plant of thirty cells which had been used since December 15th at the Company's laboratory at 118 Charlestown street, and was moved to 109 Court, without emptying the batteries, was recharged for the first time March 20. This makes over three months of hard work which the solution has done, running lights, motors, fans, sewing machines, etc., for the edification of visitors at all hours of the day.

BOSTON, Mass., March 23.

The REVIEW office has been overwhelmingly honored with gifts of historic and other interest this week. First came two photographic views of the present telephone badges, worn by all prominent members of the fraternity on the Pacific coast, invented after considerable midnight toil, by Mr. Jno. I. Sabin, of San Francisco. This style is also very much in vogue among the Old Guard Electrique. The second gift came from Texas, consisting of two large centipedes and a well developed tarantula, suspended in a glass bottle filled with alcohol. Mr. Frank B. Knight, of the American Bell Telephone Company, is our valued contributor on this occasion, and accompanies his gift with the following particulars:

"This particular centipede got into a little difficulty with the manager of the Austin exchange, and came out second best in the melee; he—the 'centi,' not the Mgr.—had the misfortune to lose several of his legs. Still he could have managed to hobble about, had it not been found necessary to snuff out his ambitious young life. In your anxiety to get at the alcohol in which the animal is preserved, be careful not to collide with his claws, as there may be 'pisen' in 'em yet."

At Murraysville, Pa., a great fire of natural gas is now in progress. The roar of the escaping gas can be heard at a distance of four miles from the well, and the light of the gigantic tower of flame illuminates the country around for a radius of twelve miles. The laborers who tried to dig the trench worked for three minutes at a time, with their heads swathed in bandages soaked in ice-water to prevent exhaustion from the intense heat. After six hours of terrible suffering the pipe was reached at a distance of several feet below the ground, where it was chiselled as deep as could be done under the circumstances. Then an immense chain was hitched to the upper part of the pipe, and 150 men began a tug-of-war. The pipe was bent over and then broken, and the flame, instead of pouring out in the air, belched forth over the ground and the break in the main supply-pipes at a distance of 50 and 75 feet from the well, which was thus relieved. What can or will be done to stop the burning well cannot now be told. So great is the force of the escaping gas that a sixteen-ton auger, such as is used in oil wells, was thrown aside when placed over it. Tons of iron pipe on a platform run over the mouth of the well to snuff the flame were cast aside and scattered like straw. The village of Murraysville is practically deserted. The fire in the village was checked last Tuesday, but the derricks of two of the other immense gushers were torn down by the people from neighboring houses. Farm houses out of the range of the deadly element are crowded with refugees, and in some instances the pouring rain to-day soaked and ruined household goods piled up on the hillside. It is a deserted, desolate village.

Telephonic News

*** In the case of the Bell Telephone Company against the National Improved Telephone Company, New Orleans, the arguments have closed, and the court has notified the defense that ten days would be allowed for filing briefs.

*** The telephone and electric light companies, of Youngstown, Ohio, are not dwelling together in peace and love. The telephone company asks for an injunction restraining the lighting company from running certain parallel lines.

*** It has been finally settled that the Government's suit against the Bell Telephone Company, to test the validity of its patents, shall be brought at Columbus, Ohio, and the United States Attorney for that district has been instructed accordingly.

*** Indianapolis and the other cities in Indiana are to have a chance to get along as they did ten years ago, before the telephone was known. The Hoosier State is in the position of the man who wanted some one to help him let go of the bear.

*** President Forbes, of the American Bell Telephone Company, is reported as testifying that he thought the capitalization of the New England Telephone Company was too large by one-half—it should be $6,000,000 instead of $12,000,000.

*** The telephone line recently constructed between Vienna and Brunn, a distance of 70 miles, in a straight line, has worked so well that a similar line is being built to connect Vienna and Pesth, a distance of 136 miles, and the projectors are sanguine of success.

*** The next dividend on the stock of the N. E. Telephone Company will probably be passed. The damage by recent storms is said to have amounted to fully $20,000, and this, added to its ordinary construction and expense accounts, will, in all probability, leave, when taken from the gross, an extremely small balance for dividend purposes.

*** The Brown Telephone Company is organizing in St. Louis with the following Board of Directors: Dr. H. T. Brown, of New York; Web M. Samuel, John Scullin, R. M. Scruggs, Ewing Hill, S. M. Kennard, W. W. Senter, James L. Huse, L. C. Norvill, Charles L. Thompson, J. E. McKeighan, James Bannerman, and Charles Clark. The battery is to be dispensed with in the Brown telephone.

*** Dr. Lenz, in the *Bulletin* of Academie des Sciences de Saint Petersburg, describes an ingenious application of the telephone to the measure of differences of temperature between stations at a distance from each other. Suppose the two stations to be united by two dissimilar wires—say of silver and iron—with a soldered joint at either end. If the temperatures of the two joints are dissimilar, a thermo-electric current will be developed and circulate in the wires. If, now, a telephone and interrupter be brought into the current, the former will sound until the temperature of the ends is equalized, when the current ceases and the telephone becomes silent.

*** The following resolution has been adopted by the city council of Evansville, Ind.: That upon failure or refusal of the telephone exchange to furnish service to the city or its citizens, as provided for under the laws now in force, that the right of way heretofore granted to the Evansville telephone exchange and its successor upon the streets, lanes, alleys and public ways of this city be revoked, and that the city attorney be and he is hereby directed to prepare an ordinance repealing all rights and privileges to said exchange, and that the poles, wires and other appliances be removed within thirty days from the passage of the said ordinance, and any ordinance giving said company any rights be repealed.

*** The distinctive features of the "Turnbull" long distance telephone have been recently patented by the inventor, C. Turnbull, of Baltimore, Md. The claims for it are power to transmit sound clearly over great distance, and increased clearness over short distances. It is a multiple contact telephone; instead of the vibrations of the voice being transmitted to the wire at a single point of contact, there are provided any number of points that may be desired, the number varying, as the distance to be covered, and the intensity of the sound being increased up to a certain limit by every additional point of contact. The speaker talks against a thin wooden diaphragm about four inches square. To the back of this diaphragm are attached two carbon rods, one above the other, lying horizontally at unequal distances from the diaphragm. The upper rod is nearest the diaphragm, and to it are pivoted three, four or five pencils of carbon, the number varying according to the points of contact desired. These pencils fall by their own gravity against the lower horizontal rod. To these rods the poles of the battery are attached, and through them the sound-bearing current passes. Each pencil forms two points of contact for the current—one on the upper rod, one on the lower. By increasing the number of pencils sufficiently a roar of sound is said to be produced.

*** It having been made manifest during several winters, particularly the last past, that much more effective work can be done in desperate cases of shipwreck by an expeditious combination of the rescuing forces along the coast, a movement has been inaugurated looking to the establishment of telephonic communication between the life-saving stations on Cape Cod. The only communication between them now is the primitive one of a messenger, who has to make his journey over the shifting sands beaten about by the ocean gales—the slowest possible and most tiresome locomotion that can be imagined. Valuable time is thus lost in critical cases that could be saved by an instantaneous word over the wires. Recent instances can be cited wherein, with the use of the simple telephone, lives could have been saved by a prompt response to a summons from one station to another for reenforcements of men or apparatus. A petition to the United States Senate and House of Representatives in furtherance of this humane project has been desked at the Merchants' Reading Room, No. 7 Exchange place, Boston, and is receiving the signatures of Boston's most active merchants, ship owners, and other influention gentlemen. It is hoped that with the co-operation of all people of influence at Washington, the telephone lines will be established ere next fall's storms arrive.

*** Thomas D. Lockwood, of the American Bell Telephone Company, recently appeared before the Committee on Mercantile Affairs, Boston, and was examined upon the feasibility of placing telegraph wires under ground. He stated that the only cities in Europe where they are so placed are London and Paris, and its feasibility there is owing to the great sewers and galleries beneath these cities. Boston, New York, Chicago, and Washington have wires under ground There are several obstacles to laying telephone wires under ground, 1st, the subscriber dictates where they shall come out; 2d, when the wire gets out of order it must be taken out to be repaired. 3d. The difficulty of perfect insulation. 4th. Establishing a circuit, which would compel the placing of two wires where only one is now needed. It is twenty-one times harder for the electric current to pass under ground than above. There have been 467 inventions towards placing electric wires under ground, each one of which is believed by its inventor to solve the problem. One of them, Mr. Spalding, was before your committee yesterday, but, although he is a prolific inventor, he unfortunately knows less of electricity than he does of making glue, and his inventions are very impracticable. Although the expense of placing wires under ground would be great, the telephone companies would not be deterred in the slightest by it if the electrical difficulties could be overcome.

The Telephone Case in New Orleans.

INTERESTING ARGUMENT BY HON. E N. DICKERSON, OF THE BELL COMPANY.

In the case of the Bell Telephone Company against the National Improved Telephone Company, arguments have been heard by the New Orleans Court, and the case taken under advisement. We have heretofore made mention of the arguments presented by the several attorneys, and in the following will be found the many strong points made by Mr. E. N. Dickerson, of this city.

Mr. Dickerson said in substance: The defendants have not ventured to rely even on their own testimony nor on the established truths of science. They have undertaken to reverse all accepted knowledge by having their counsel testify to what no one else in the books of science or in this record can assert.

He testifies that he believes nothing, and that all science is a nonsensical jingle of words, which it is dishonest to believe; and that all scientific man are ignorant or unfit to be trusted, and so by his expression of his own ignorance or doubt he smashes science.

One trouble with the defendants is that they do not use terms and language in the sense in which they are always elsewhere accepted; hence their argument falls into idle controversies, leading to no results. Thus, upon his understanding of the word quality he is right in saying that all sounds have quality; that is, each sound has a character of its own But science has applied this word to compound tones; that is, to sounds which have overtones. It is possible to produce from a tuning fork a sound which in technical language is due to a simple pendulous vibration, though it is not very easy; such a sound is technically called "pure" or "simple." But most sounds are compound or complex by the admixture of other tones, generally of higher pitch, which are not heard separately, but blend with it and modify its character without changing its pitch as a whole. Sounds which have this admixture of what are thus called overtones are said to possess quality.

This, or the experimental demonstration of it, is due to Helmholtz.

In this complex sound the prominent tone which gives the pitch of the whole is generally the lowest in pitch and is called the fundamental.

Pythagoras discovered the natural scale; that is, the ratio between different sounds which harmonize. 1, 9-8, 5-4, 4-3, 3-2, 5-3, 15-8, 2. That makes a musical octave. It is a relation which exists in nature by measurement. Pythagoras discovered experimentally just what these relations were, and expressed them. Twenty-four hundred years afterwards Helmholtz discovered why sounds so related gave the most agreeable result. Musicians take a sound of any convenient pitch for a standard and then apply the scale to that. That pitch is what is called the standard pitch, or in some cases concert pitch.

All vibratory motions are gradual; that is, not *per saltum*. Science so uses the term.

Mr. Beckwith thinks that theory in science means an unproved hypothesis. Theory in science means the ascertained explanation of phenomena. An hypothesis is a suggestion recognized as not established but open to experiment, proof or refutation.

The simple magneto form of the Bell telephone is one of the most beautiful exhibitions of the conversion and conservation of energy. The feeble power of so much of the voice as falls on the diaphragm is converted into electricity which works the instrument at the other end; but besides this, heat is generated in the diaphragm, in the wire, in the coil, in the magnet. This goes off into the air and is dissipated, in popular phrase, wasted. Yet so delicate is the receiver that it speaks under what power is left. Read a description of the Bell magneto telephone from Ganot's standard work on physics. The power required is far less than 1-100,000 part of that due to one cell of a battery.

The Reis transmitter can to-day be used, by means of the knowledge disclosed by Bell and his successors, so as to produce to a feeble extent an undulatory current; bu those undulations are too feeble to affect a Reis receiver.

Counsel then explained the nature of sound vibrations, how they were studied and measured, and the accuracy with which science has measured them and actually made them visible by Toepler's experiment.

Mr. Beckwith said that if there were such things as sound waves, they would interfere and would, or might, produce silence. They do; it is a familiar school experiment. The length of a particular sound wave by a resonance jar consisting of a tall glass filled with water. When water enough is poured in to give the loudest sound, the air space above the water is just half the wave length of the particular sound produced.

Electricity—We do not know what it is, but we know how it acts, and we know it so well that given certain conditions we know what will happen.

Mr. Dickerson then proceeded to some experiments with a galvanometer and a circuit breaker. The magnetism of the earth tends to keep the compass needle in one posi ion. When an electric current is passed through properly arranged coils it tends to make the needle deflect or swing to one side to an extent depending on the strength of the current—the greater the current the greater the deflection. But the forces acting on the needle are feeble, and it can only move slowly. A common hand telephone was placed on one of the wires through which an intermittent current was passing, and the inductive effect of the intermittent current on the telephone was so great that not only was a loud sound heard in that telephone, but also in another twelve feet off and connected with it by wire. This was merely by electric induction through the air and the hard rubber handle of the telephone, there being no direct electric connection whatever.

In the experiments with a galvanometer and circuit-breaker it was observed that when a steady current was passing the galvanometer needle stood at 40; that when the intermittent current was passing the galvanometer needle stood steadily at about 25. Why was this, and what did it indicate? Mr. Beckwith had said in his argument that it indicated some accidental leakage of current. Mr. Dickerson showed that it meant nothing of the kind. The galvanometer indicates how much electricity is passing. If you keep the current flowing all the time, but take away half the battery, only half as much flows in a minute. If you keep on all the battery and only let it flow every alternate second, then also only half as much flows in a minute. Now, making and breaking the circuit so that it is broken half the time is taking off the battery every alternate second, and only half as much current passes in a second as there did before. The mean strength of the current is the same as if half the battery had been taken away.

Counsel then took up the Bell patent, and explained that it was a patent for producing electrical undulations similar in form to the sound vibrations which constituted the word uttered into the transmitter, and that the claim did not use the phrase "current" at all. The office of the battery is to magnetize the cores. When the armature is vibrated by the voice, as it moves in one direction it adds to the battery current, and as it moves in the other direction it partly neutralizes the battery current; and thus the battery current is alternately increased and diminished. The improvement of the second patent in this respect was in dispensing with the battery and using a permanent magnet to magnetize the cores of the electrode magnets employed. The battery transmitter or

microphone is covered by the Bell patent, because that also, in the language of Bell's claim, produces electrical undulations similar in form to the waves of the word spoken, but it does not furnish electricity; it only lets on more or less of the electricity furnished by the battery.

Before beginning the experiments with the galvanometer, Mr. Dickerson showed that a battery consisting of a drop of acidulated water placed on the end of a flattened wire, with a pin of zinc dipped into it, was enough to throw the needle violently round as far as it could go, and that when by a peculiar arrangement, only one-tenth of the current arising from the drop of acidulated water allowed to pass through, the instrument was deflected 10° or 20° to stand still, but there is in it a little tremor at each change of current, too small for the eye to detect. By a peculiar arrangement a set of galvanometer needles can be fastened to a diaphragm, and then when a microphone is connected with the whole the tremor of the needle can be heard as speech.

Mr. Dickerson performed some experiments, and arranged a Reis apparatus made by Koenig, of Paris, and operated it by the sound of a tuning fork and by speaking to it, and showed that the result was a whirring noise and a series of sparks at the transmitter caused by the circuit-breaking operation, and that the sound heard at the receiver had a peculiar buzz, something like that of a fly caught in a spider's web, or a fly in a paper box; and then pointed out that some of the most prominent German writers who had described the Reis apparatus in 1865 said that it was just that noise, and not speech, that could be got from it.

He then showed that the defendants had not ventured to try a real Reis instrument, but had introduced modifications and improvements invented by Bell and others.

He then explained the Bell patent, and pointed out that the amendment which was talked of by the other side added nothing to the patent, and the complainants were perfectly content to read the patent without it; it was merely a statement that something which Mr. Bell had shown in one of his own prior patents was not what he was showing in this. The essential thing which was described in Mr. Bell's application, written and sworn to three weeks before Mr. Gray began to think of his caveat, was that he had discovered that he could use electricity so as to impress upon it the likeness of actual sound vibrations, and by this means could convey, not only the pitch of the sounds, but their loudness and characteristic distinctions.

Mr. Dickerson pointed out that there was no pretense that Gray had made the invention at the time Bell completed and swore to his original application.

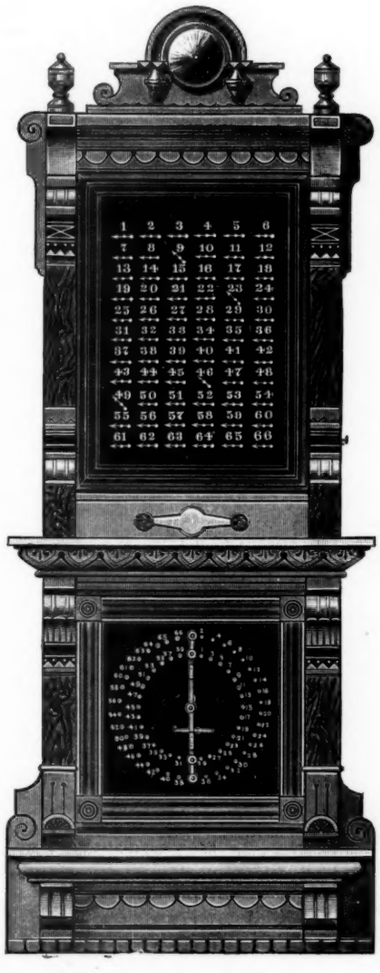
He then pointed out that the liquid transmitter made by Bell was in accordance with the description of the liquid instrument in Mr. Bell's original application, and quite different in its working parts, and some of its principles from the one shown in the Gray caveat; and that the differences were such as to make it certain that Bell had not copied from Gray, even if there were any evidence that he had, and even if he had not described it in writing before Gray had; but the latter was the fact.

He then claimed that the defendants infringed, and, according to the testimony, they used in New Orleans at the time this suit was brought, the same telephones which had been decided to infringe in the suit they defended at Pittsburg. The new instrument filed in court this week as the one defendants are now using is an infringement, because the McTighe patent, under which they act, says that his instrument is merely an improvement upon the principles invented by Mr. Bell and shown in his patent, and because the transmitter they now use is admitted by them to work on the same principle as the Blake, and is a microphone. It is not such an instrument as is described in any of the Randall patents; but even if it were, it would infringe, for the Randall patents are not for transmitting by intermittances of current; but they are for transmitting speech by the Bell method, in spite of some interruptions which are said to take place in the instrument. But those instruments are not good for anything practically, and so the defendants had to take out all the parts which expose them to interruptions before they were fit to use.

The court then adjourned, and on the following day listened to an elaborate argument by Mr. T. J. Semmes, which concluded the hearing

Hotel Fire Alarm and Room Call of the Western Electric Company.

Notwithstanding all that science and building skill have done during the past few years in the better and safer construction of hotels, there is nothing so much dreaded alike by landlord and guest as fire.



HOTEL ANNUNCIATOR, FIRE ALARM AND ROOM CALL OF THE WESTERN ELECTRIC COMPANY.

The many hotel fires in the last few years, with their startling record of lives lost and property destroyed, show conclusively that the most anxious watchfulness on the part of landlord and assistants is not sufficient to prevent their almost periodical recurrence.

Inventive genius has done much, by the introduction of stand pipes and fire escapes, to lessen the danger in case of fire, and the introduction of the improved hotel fire alarm and room call of the Western Electric Company, shown herewith, provided reliable means for automatically arousing every sleeping guest in a burning hotel, no matter how large the structure.

The value of this system is not alone in its capacity as a reliable fire alarm. With it the clerk can instantly answer the call of an impatient guest; can call a guest at any hour, thus avoiding the necessity of sending the porter to rouse a sleeping guest by pounding on the door, to the annoyance of the occupants of adjoining rooms, or can ascertain at once if a guest is in his room by simply pressing the button on the fire alarm dial corresponding to the room he desires to call. The apparatus is so arranged that the call bells in the rooms will give but a single tap when used as a call, and ring as vibrating bells when operated as a fire alarm.

*** The work of the committee appointed to investigate the Pan-Electric Telephone Company and the connection certain eminent officials had with it, is developing some interesting history. The affidavit of United States Senator Vest, of Missouri, was first taken, and it appeared that he had invested $1,000 in the stock, on the recommendation of Senators Harris and Garland. His transaction was purely a business one, and his statements cleared him of all questionable action. The two Rogers were questioned at length concerning the organization of the company and the distribution of the stock. The elder Rogers stated that some of the gentlemen were inclined to treat the proposition of presentation of stock with contempt when the amount was small, but when the donations were made in blocks of $100,000 to $500,000, their interest increased, and the offer was generally accepted. This gentleman also testified that he understood from Casey Young that Mr. Garland (Attorney-General) had agreed to have suit brought through Solicitor-General Goode. This contradicts the Attorney General, who in his letter to the President stated there was to his knowledge no arrangement made to have the suit brought. Casey Young, in his testimony before the committee, also contradicts Dr. Rogers.

TELEGRAPHIC

.... A Telegraphers' Athletic Association has been organized in Buffalo.

.... The Brooklyn Electric Company, with a capital stock of $50,000, has been organized with Edward B. Bartlett and others incorporators.

.... The Universal Electric Company has been formed in Chicago with a capital stock of $1,000,000. W. F. Stewart and others are the incorporators.

.... The National Electric Service Company, Rye, N. Y., and Chicago, Ill., has recently been organized with a capital stock of $1,000,000. William T. Pratt and others are incorporators.

.... The scarcity of gentlemen at a neighboring summer resort was so apparent that a Boston lady telegraphed to her husband: "George, bring down a lot of beaus for the hop this evening" Thanks to the telegraph manipulator, George arrived with a "pot of beans."

.... There are 860 persons employed in the Paris main Telegraph office, namely 510 males and 350 females. The number of messages transmitted daily varies from 36,000 to 40,000. Besides the main, there are seventy-five public telegraph offices in Paris.

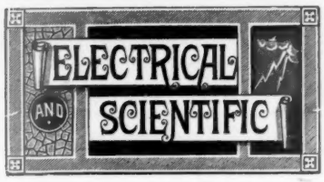
.... The notable activity in scientific investigation is well illustrated by the host of new products which, during the past few years, have been added to price lists and catalogues. This is particularly the case in metallic lines and electric supplies.

.... G. Adolphus Stimpson, of Carlton avenue, Brooklyn, is the scientific map draughtsman of the Western Union Telegraph Company. His work is very accurate, delineating the location of every wire of the immense and intricate system of that great concern.

.... The New Orleans *Picayune* is some what disturbed. It says: "Street car companies only own the surface of such streets as they choose to occupy. Below the surface, the gas and waterworks companies are sole proprietors. Above, the wire concerns —such as telegraph, telephone and electric companies—are supreme. Any other odd space that may happen to be about is used by the city for storing dirt."

.... A mortgage for $500,000 made by the Empire and Bay States Telegraph Company to the Farmers Loan and Trust Company, to secure a loan for that amount, was filed in Brooklyn last week. The company proposes to build, equip and operate lines from New York to Bridgeport, New Haven, New London, Stonington, Newport, Worcester, Newburg, Poughkeepsie, Hudson, Albany, New Jersey, Philadelphia, Baltimore and Washington.

.... It is stated that the Telegraphers' Brotherhood intends going back in a body to the Knights of Labor. After the failure of the strike in 1883, there was great dissatisfaction at the action of the Knights of Labor in regard to the strike, and as a result the telegraphers gave up their district charter and started out as a separate organization. Some of the best men, however, retained their relations with the knights, and have worked hard ever since to counteract the hard feeling left by the strike. As a result, the brotherhood has made up its mind to make application for another charter, which will without doubt be granted to it. One of the leading members said in regard to the movement: "The late action of the Western Union company in delaying a scrip dividend is regarded by the men as portending a reduction in wages. As an isolated body we might have difficulty in resisting it, but with the backing of the Knights of Labor they will hesitate to bring on the conflict which would undoubtedly result from an attempt to reduce wages."



* * The citizens of Frederick, Md., want the electric light, but first desire to dispose of a two years' gas contract.

* * The Washington monument is said to have a movement at the top of two inches, one inch in each direction, east and west, between sunrise and sunset.

* * An interesting field for scientific research has been opened by Prof. S. P. Langley by the discovery that the heat radiated from the soil is of an almost totally different quality from that which comes from the sun.

* * Composite photography has been applied by Dr. Persifor Frazer, of Philadelphia, to the testing of signatures. Though his experiments cannot yet be said to ensure absolute certainty in discriminating true from forged writing it is considered that one great point, at least, has been gained, "in the fact that it removes the judgment * * * from the possible bias of personal expert opinion, and allows the testimony of the photograph to be weighed by judge and jury, like any oth r testimony."

* * The Roberts-Brevoort Electric Company, Limited, has been incorporated with a capital of $100,000. Edwin Tweedy, of Danbury, Conn., president; Henry L. Brevoort, New York, treasurer; B. T. Vetterlein, New York, secretary; J. Roberts, New York, electrician. This company owns all the patents on batteries, motors and electrical apparatus taken out in the name of J. Roberts. The object of the company is to develop these patents. The office of the company is at No. 206 Broadway, New York City.

* * It is estimated by insurance companies that in the United States last year dwelling-houses were burned at the rate of one every hour, with an average loss of $1,396. Barns and stables, fifty per week. Country stores, three per day, with a loss of $110,000 per week. Ten hotels burn weekly, with a loss per year of $4,000,000. Every other day a lumber yard goes up in smoke, each representing $20,000. Forty-four cotton factories, the loss in each case being $28,000; forty-three woolen mills at $25 000 each and forty-two chemical works, at $27,000 each, were destroyed by fire last year. Forty-two boot and shoe factories were consumed, the loss being $17,000 each. Theaters were lapped up by the flames at the rate of five per month; average loss, $19,000. Only about half as many court-houses were destroyed, the cost of each being about $20,000.

* * Mr. Landauer, Belgian Consulate, New Orleans, stated that since 1876 his king has instituted an annual prize of 25,000 francs, equivalent to $4,825 of American money. This yearly competition is purely national, but the king has announced an international prize for 1889, to be awarded to the author of the best work upon "electricity; the progress in its uses as a motor and for lighting purposes, with all applications that can be made of it for such purposes, and the economical advantages which this use may offer." Foreigners desirous of competing will have to send their works in manuscript or printed to the Minister of Agriculture, Industry and Public Works, Brussels, before January 1, 1889. A new edition of a printed work will be accepted if it contains many new points and much greater information than the preceding edition, and the date of publication be not earlier than 1888. The competing work may be written in English, French, Flemish, German, Italian or Spanish, and if in manuscript will be required to be published within a year after the granting of the prize. The jury of award is to be given by seven members appointed by the king, and to be composed of three Belgians and four foreigners of different nationalities.

* * Mr. Charles F. Brush, of Cleveland, has received two patents on secondary battery, application for which were filed June 13, 1881. These two patents, consisting of thirteen and fourteen claims respectively, probably give Mr. Brush the full control of the storage battery in this country, at least as far as the authority vested in the Patent Office will be recognized.

* * The following chunk of wisdom is from *Mechanics* of this city: "Buyers very seldom mention in what paper they saw an advertisement. We appeal to any advertiser, who is also a buyer, to say if he ever mentions in his first order for goods from any dealer that he 'saw his advertisement in such and such a paper.' On the other hand, those who do *not* intend to buy, and who write with pale or red ink, or with aniline pencil, on postal cards, asking for photographs, or for illustrated catalogues, almost invariably do mention the paper which is responsible for their writing."

* * An instrument called by its maker the "slammophone" (probably from the Greek *slammus*, to bang the door, and *phonos*, to make a noise!), is attached to the door of the Clarke studio, Oakland. The slammophone, which is something like an Æolian harp, is fastened against the door in such a way that a series of pendent hammers strike the strings when the doors are opened or closed. The coming or departing guest is therefore greeted by a chorus of sweet sounds of his own making, and, until informed, cannot for the life of him tell where the weird music comes from.

Electric Railways.

By Robert Luce, of Boston.

Mr. Robert Luce, of the Boston *Globe*, is the author of a work on "Electric Railways and the Electric Transmission of Power," published by W. I. Harris & Co., Boston. The subjects are treated of interestingly and intelligently, and are all brought down to date, comprising electric transmission of power, history of electric railways, cost of electricity, telpherage, etc. In concluding, Mr. Luce says:

"An important feature of electric railways will be the use of their power for many minor purposes. Not the least valuable is the lighting of the cars by electricity. There is no need to dwell on the imperfections of the present system of lighting railway cars. In a few drawing-room and sleeping cars the electric light has been tried with success only moderate, because the batteries will not run many hours, and dynamos stop when the train stops. Accumulators are necessarily bulky, and, though some progress in their use has been made abroad, little or nothing has been done with them here. In an electric railway the use of the power necessary for making the cars almost as light as day will hardly be noticed at the central stations. Electric head-lights are coming into use; their advantages will be gained at less cost on electric railways. The possibility of heating cars by electricity has been discussed, but nothing has yet been accomplished toward making the cost anywhere nearly as cheap as coal. It is probable, however, that there will be great advance in this direction. When we have electric heating apparatus, the danger from fire in case of accident, already greatly reduced by the use of electric lights and fireless locomotives, will be at a minimum. . . . Already the beginning has been made. The infant art is taking its first steps—short, weak, tottering, to be sure, yet full of promise of the growth to come. Will the public stretch out a helping hand? Will the public nourish the child, not for what it is, but for what it may be in future years? . . . The steam railway had a harder fight to make than the electric railway has so far had. By its own merit it triumphed at last. The child survived, and now as a man is doing a good share of the work of the world. Another child promises in time to come to do that work better. Shall we not give it a speedy chance to fulfill the promise?"

Telegraph Men in Washington.

The House Post Office Committee has been sitting at Washington for several days hearing the testimony of several eminent telegraph men. The subject investigated was the alleged monopoly by the Western Union of the telegraph facilities of the Pacific railroads. President D. H. Bates, of the B. & O. Telegraph Company, was the first to testify, and very naturally appeared in opposition to the Western Union Company's position, and in favor of opening the railroad telegraph facilities to all telegraph companies. He presented strong arguments in support of his views.

President Norvin Green, of the Western Union, in his testimony, stated that when the roads were built the charters contained provisions allowing the Overland Pacific, the California State and the United States Telegraph Companies to reconstruct or remove their lines; and it was also stipulated that the roads might contract with the telegraph companies and authorize them to establish lines for public accommodation and the use of the roads in lieu of their own lines. The Western Union now included the Overland Pacific, the California State and the United States Telegraph Companies. The United States Company, as absorbed by the Western Union, had included the United States Telegraph Company, the Independent Telegraph Company, the United States Extension Telegraph Company, the Inland Telegraph Company and the Inland Extension Telegraph Company. Therefore, the Western Union wires ran over the Pacific roads, not by the companies' consent, but by its right under act of Congress. For a number of years the railroad wires were used in competition with the Western Union Company, and the result was not an increase of business or a reduction of rates. The $1 Western Union rate to San Francisco was the lowest in the world for the distance, except over the government lines between Paris and Algiers. There was no doubt that the Pacific railroads were bound to take messages from all companies, nor was there any doubt that they were prepared to do it. Their superintendent, Mr. J. J. Dickey, had told him (Dr. Green) that not a single message had been offered by a competing line; that the railroad companies were always ready to take any message offered. The company that figured largest in this investigation, Dr. Green claimed, had not a wire within 400 miles of the Pacific roads.

Mr. J. J. Dickey, of Omaha, superintendent of telegraph for the Union Pacific Railway and district superintendent of the Western Union, gave his testimony in substance as follows:

The Western Union and Union Pacific held separate telegraphic property. The accounts for public telegrams at railroad stations were kept by the railroad company and reported every month and the proceeds of the business equally divided. In the larger cities the Western Union had its own offices separate from the railroad offices, and the receipts went to the Western Union. In those cities the railway company maintained separate offices also, but little public business was offered. There was a clause in the contract that bound the Union Pacific to give the exclusive preference in its telegraphic business to the Western Union as far as they could legally do so. The Union Pacific regarded the agreement as an economical business arrangement.

Mr. Warner requested Dr. Green to state the nature of the relations between the Western Union and Central Pacific. He replied that the Western Union paid the Central Pacific $100,000 per annum and took all the receipts along the line of road. The railroad company also had the free use of Western Union lines on the line of the road. That arrangement embraced the Southern Pacific from San Francisco to El Paso.

Mr. Dickey concluded his testimony with the statement that the Union Pacific Company was ready to take any business offered by the Baltimore and Ohio or any other telegraph company; but that none had been offered.

As Mr. Peters had remarked upon the high tariff to Kansas points, Dr. Green promised that the rates would be reduced in that locality. Further, he said, he wished to explain the position of the Western Union in the matter of news reports. It was the only telegraph company that had absolutely refused to make up news reports. With respect to the President's message, he said it had handled the message for years without profit. It was supplied to anybody at ten cents per hundred words, and to newspapers taking their reports from the Western Union at five cents per hundred. The Western Union could supply it cheaper than any other company. It had supplied the Kansas associated newspapers with the last message (20,000 words) without one cent in compensation.

On Telemicrophonic Apparatus.

By M. E. Mercadier.

I give the name telemicrophonic to mixed apparatus which produce simultaneously the effects of microphones and telephones and which are reversible, like the latter. Their construction, as regards transmission, rests on the following facts:

1. We may act upon a telephone or a microphone by the intervention of any thin, *rigid* plate whatever and of a stratum of air, limited or not.

2. We may, without causing a magnetic diaphragm to lose its telephonic properties, load it with weight up to a certain limit, which may even exceed the weight of the diaphragm. These two properties were indicated in the theory of the telephone which I gave in the *Comptes Rendus* (vol. CI., pp. 744 and 1 001).

3. The effects of a microphone placed in the primary circuit of an induction coil, and of a telephone placed in the secondary circuit, are superimposed when we act simultaneously upon both apparatus, either superimposing themselves or placing them in juxtaposition, or combining them intimately, the microphone being fixed to the membrane of the telephone.

As regards reception we may base it upon the following principle, which I have indicated as regards radiophonic effects (*Comptes Rendus*, vol. CI., p. 944), a principle already applied, but incompletely.

4. When the membrane of any telephone whatever separates two air chambers, the one without and the other within the instrument, we may receive distinctly and strongly the movements of the membrane transmitted to the air by the aid of one or more acoustic tubes adapted laterally to these chambers, provided we give them suitable dimensions.

In accordance with these data, I have had constructed two types of telemicrophones, which give good results, the one in which the telephonic and microphonic organs are superimposed, and the other in which they are combined.

We easily obtain an apparatus of this latter type by the aid of a D'Arsonval telephone, to the membrane of which are firmly fixed the carbons surrounded by a thin iron cylinder of a microphone of the system of D'Arsonval and P. Bert. These carbons are in the interior of the apparatus, a small auxiliary magnet regulating their pressure upon their support.

The membrane is surmounted by a lid forming an air-chamber of at most 0 01 metre in height, perforated with a central aperture, covered with any thin, rigid plate glass, mica, wood, etc, against which we speak, and by two lateral apertures to which caoutchouc tubes may be adjusted.

The electric communications are the same as in an ordinary microphone; the carbons are connected to the primary circuit of an induction circuit, comprising the battery; the extremities of the coil of the telephone are connected to the outer circuit, comprising the secondary wire of the bobbin.

As regards transmission, when we speak into the apparatus, the iron membrane vibrates and produces simultaneously the following two main effects: 1, a microphonic effect in the primary circuit of the bobbin, consequently movements of the carbons fixed to the membrane, whence re-

sult ordinary induced currents in the outer circuit; 2, a telephonic effect in consequence of the movements of the membrane in the field of the magnet, whence result in the same outer circuit other induced currents which are superimposed on the former.

Although the weight of the carbons is greater than that of the diaphragm and is regularly distributed over its surface, the apparatus acts very well as a telephone, if we suppress the microphonic effect, *e. g.*, by opening the circuit of the battery; if, therefore, this suppression is produced accidentally, the transmission may continue without difficulty.

As for the reception, the apparatus is reversible, since it contains all the elements of a telephone. To use it as a recipient it is sufficient to raise it to the ear. If we wish to leave it on a fixed support we make use of acoustic tubes adapted either to the lid or to the chamber formed in the interior of the instrument. Care must be taken, as mentioned above, to have suitable dimensions so as to avoid the effects of resonance, which give a sort of blur to articulate speech.

In determining these dimensions we may, without notably reducing the effects, adapt several acoustic tubes of small diame er (about 0.01 meter in diameter) to each of the air chambers of the apparatus. This enables several persons to receive at once the sounds or the words transmitted. We obtain thus a telemicrophone with multiple hearing tubes.

It will be seen, however, that this arrangement is applicable to ordinary telephones. I have thus, in fact, constructed telephones with 2, 4 and even 8 lateral hearing tubes, giving results capable of interesting applications.

The chief advantages of telemicrophones over ordinary microphones are the possibility of a double mode of transmission with the same apparatus, the reversibility of the transmitter which much simplifies reception; the reduction of the number of organs of microphonic stations and consequently the decrease of the total resistance of the apparatus on one and the same line. This reduction permits us to simplify the construction of the apparatus and to diminish considerably their volume.

An Electric Engine for Cars.

A new electric tram engine was shown recently at the station of the North Metropolitan Tramway Company, Stratford. This is a center at which fair trials have always been readily accorded to any new motor, and is understood that in the event of the new inventors and the tramway company agreeing upon terms a practical experiment of no small importance will be made in electric tramway working upon the new line to Ilford. The electrical engineers in this case are the Electric Locomotive and Power Company (Limited), who claim to have solved the problem of economical working by combining the electrical power with the mechanical aid of the lever principal. The electromotor is connected by pinions horizontally with a large stationary rack and vertically with the wheels. When the electrical engine is started the pinion of the horizontal armature gears into the stationary rack, and so causes the motor itself to revolve. The motor then becomes, by the action of its fixed vertical shaft, the driving axle, and communicates its motion to the wheels of the car. By means of clutches a backward or forward motion can be secured without reversing the direction in which the electro-motor is revolving. The electricity is supplied from 50 cells, say, a total of 250 amperes. It is claimed that the average discharge is from 40 to 45 amperes per hour, and that an engine consuming only two tons of coal per week will charge batteries sufficient to do the work of four cars requiring at present 44 horses per week. The engine appears to be controlled with perfect ease, and though at present it is fitted up separately from the car itself, so as to take the place of horses and utilize existing cars, the company claim that it can in future easily be constructed as a part of the passenger car.—*London News.*

The Electric Light in Buffalo, N. Y.

The Brush Electric Light Company, of Buffalo, have recently completed large extensions to their capacity, which was quite large before. This company is supplying 538 public lights at the present time, and receive from the city 55 cents per light per night, every night in the year. In a recent schedule circular issued by the company, we take the following, as the price therein contained will be of interest to all who are engaged in electric lighting:

"We will furnish from April 1, 1886, mercantile lights, to burn seven hours from dark, every night except Sundays, at $11.00 per lamp per month, on contracts for one year. A discount of $1.00 per lamp will be made, if bills are paid on or before the 10th of succeeding month.

"This being a reduction in price of over 20 per cent., it is anticipated that a large number of contracts will be made. It will be our aim to produce the best light in the country.

"All wiring, lamps, globes, carbons, etc., will be furnished by us and remain our property. There will be no charges additional to price named, for maintaining lamps.

"Prices for lights furnished on contracts less than one year will be based on following schedule:

11	months,	$11.50	per	lamp	per	month.
10	"	12.00	"	"	"	"
9	"	12.00	"	"	"	"
8	"	13.00	"	"	"	"
7	"	13.00	"	"	"	"
6	"	13.00	"	"	"	"
5	"	13.50	"	"	"	"
4	"	14.00	"	"	"	"
3	"	15.00	"	"	"	"
2	"	16.00	"	"	"	"
1	"	20.00	"	"	"	"

"A discount of $1.00 per lamp will be made on bills paid on or before the 10th of following month."

A Few Words from Mr. Dougherty, of Pike County, Mo.

Editors Electrical Review:

I noticed an article in your journal of February 27th, wherein I suppose you have been mislead by some designing person or persons interested in electric lighting. Your article makes me appear as an agent for the State of Louisiana and not the town of Louisiana, situated in the County of Pike, State of Missouri. In this town, my home for twenty or thirty years, I have obtained an ordinance, No. 1,044, for the installation of an Edison plant as a commercial enterprise and nothing more, and for your scientific journal, of such a good name, to notice such a thing must certainly have been done under misapprehension.

As far as I am concerned it makes no difference, but for the sake and information of your many readers I hope you will as freely publish this as you did your article wherein my name was used "muchly;" and please, furthermore, say that the said Dougherty intends lighting Louisiana with electric light as per contract or ordinance No. 1,044.

Yours fraternally,

W. J. DOUGHERTY.

LOUISIANA, MO., Mar. 17, 1886.

—— A rat, while attempting to escape from human enemies in the electric light station in Reading, Pa., a few weeks ago, jumped directly to the floor on to one of the brushes and was thrown back to the ground. He lay motionless, apparently and certainly dead, but without even a hair turned. One of the employes was sent with a shovel to gather it up, but as soon as the shovel touched it, the rat fell to dust, with a little cloud of particles rising from the place where its body had seemingly lain. There was no vestige of hair, flesh or bones remaining. It is not generally known, probably, that Prof. Wood, of the Fuller-Wood (American Electric) company, cremated a rat by electricity some four years ago.

—— Philadelphia has 285 public electric lights—a pretty fair showing for the Quaker city.

—— The Dayton, Ohio, city council has contracted with the electric light company to light all the bridges of the city at the annual cost of $792.05.

—— Natchez, Miss., is negotiating for an electric light plant to light the city. This form of illuminant is receiving much attention throughout the South.

—— The Allegheny County Electric Light Company, Pittsburgh, Pa., S. A. Duncan, manager, will furnish one plant in Allegheny City and one in Pittsburgh, to furnish light by the incandescent system.

—— Warren P. Freeman and N. Van Beil, of the Warren P. Freeman Electric Light Company, are making arrangements for the establishing of their plant at Saratoga Springs. They have obtained permission of the village to set their poles and string their wires, and we are informed that operations in that direction will soon be begun. The above named gentlemen have been engaged looking for a convenient and practicable location for their plant.

—— At the annual meeting of the Erie County Electric Light Company, held in Erie, Pa., the stockholders elected the following Board of Directors: J. F. Downing, M. Griswold, George V. Maus, John C. Selden, C. C. Shirk, F. F. Cleveland, W E. Hayes. At a subsequent meeting of the directors, the following officers were elected for the ensuing year: George V. Maus, president; J. F. Downing, vice-president; John C. Selden, treasurer; C. C. Shirk, secretary. C. A. Lewis was reinstated as superintendent and electrician.

——The student of electricity, although he may meet with many new terms, will not it is hoped meet the fate of that scientific temperance student, who it is said, was making a thorough study of organic alcohols. He bravely waded through the primary, secondary, etc,, and when on the phenyl derivatives Trimethylphenylenediaminenitrosamine, Nitrotrimethylparaphenylenediamine-nitrosamine. It was on the Diethylmethylparaisonormaldie. . . . as the story goes, he expired.

—— The Standard Underground Cable Company has sold its holdings to George Westinghouse, of Pittsburgh. The patents were secured by R. S. Waring in 1882, and a year later the company was organized with a capital stock of $3,000,000. A large manufacturing plant was erected in Pittsburgh, and the cables were soon afterward introduced into the principal cities of the Union. Three-fourths of the capital stock was accredited to Mr. Waring. The great expense undergone in the introduction of the system has prevented the declaration of a dividend; but the stock has been rated well. Enough of Mr. Waring's stock has been purchased by Mr. Westinghouse to give the latter a controlling interest. Mr. Westinghouse becomes president. The new manager is C. H. Jackson, also of the Union Switch and Signal Company.

—— The Easton Gas Company is now willing to grant the city very favorable terms for lighting, the interest the citizens are taking in the electric light causing this change of heart. The Easton *Express* says: "Why did not the Gas Company make the same proposition long ago, and not wait until they found that at last there was danger of losing the rich bonanza they had enjoyed for years at the expense of taxpayers? For years they have been masters of the situation, made but few if any concessions to the borough, charged their own prices, and, like the old Lehigh Water Company before they were frightened into common decency and forced to assume a respectful attitude, asked 'what are you going to do about it?' Now when they find that the people are really in earnest in their determination to secure good light at a reasonable price, this company is willing to make concessions—but unless we are very much mistaken the people will quit the old concern, which has not treated them fairly, and make the effort to do better."

ELECTRIC LIGHT NEWS

—— Electric lights will soon be displayed in the Delaware and Hudson depot at Albany.

—— "Erdite" is the name of a new material, a metaloid now used in the manufacture of incandescent lamp filaments.

—— Fairfield is soon to be illuminated with the electric light. Enterprising citizens have organized a company and propose introducing the incandescent system.

—— The Brady Mast Arm has been adopted by Mr. Weeks, of the Kansas City Electric Light Company. Mr. H. M. Linnell, of Hartford, controls this mast arm.

—— The Brush Electric Light Company, of Buffalo, has increased its capital stock from $600,000 to $700,000. This is a very successful and well-managed company.

—— Articles incorporating the Plattsmouth (Neb.) Gas and Electric Light Company have been filed. The capital stock is placed at $18,000, $8,000 of which is preferred. The incorporators are Elijah Hovey,

—— The Ottumwa Iron Works of Ottumwa, Ia., having perfected their new automatic screw machine, the invention of their Mr. Johnston, have added a new line to their manufactures, that of making special turnings and shapes in brass, and will estimate on any small articles needed.

—— Messrs. Westinghouse, Church, Kerr & Co., of this city, have issued a new and unique catalogue, descriptive and illustrative of the Westinghouse Electric Company. As a work of art this catalogue is a novelty in the electrical field of literature. The work already done by this company must be very gratifying to a company so recently organized for electric business.

—— At the last meeting of the Erie City Council, the bond of the Erie County Electric Light Company to light streets was approved. The light company has forty-five 1,200 candle-power electric lights (Brush system) up for city use, and are giving good light satisfactory to the city. There are several more lights to be put up. About fifty more street lights will go up this year.

—— The Electric Light Company, of Amsterdam, N. Y., has been organized by H. S. Ward, J. A. Radcliffe, Edward McDonnell, J. K. Warnick, James H. Hurst and others. The Common Council granted the privilege to set poles and string wires through the streets. The incandescent system will be used, and a plant at a cost of $50,000 will be put in immediately. The company is for the purpose of lighting streets, factories and private houses.

—— A novel and beautiful souvenir is in preparation for the 200th performance of "Evangeline," at the Fourteenth Street Theatre, Friday evening, March 26. It consists of eight photogravure prints (the originals of which were photographed by aid of the Brush electric light) of all the members of the Evangeline company in costume, and the different scenes in which they appear, all handsomely bound together with ribbons, etc., with a very attractive cover.

—— Lightning appears in three forms; sheet, zig-zag and globular. The two former are very common and known to all. The latter is rarely seen, and its existence has been doubted by persons who have never seen it. But the evidence of its occasional appearance is too strong to be cast aside. An instance was cited in which a ball of lightning had been followed for two miles. It moves slowly and has never been known to harm any person. An incident was narrated in which a pig was killed by a fireball. The ball was seen, rolling slowly over the surface of the ground, and a pig going up to it rooted it over with his nose, and, "it was bad for the pig."

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING MARCH 16, 1886.

337,824 Clamp for holding dynamo-electric brushes while being filed; Mayberrie S. Eldon, Williamsport, Pa.

337,873 Electric gun; Samuel Russell, Brooklyn, assignor to the American Electric Arms and ammunition Co., New York, N. Y.

337,885 Commutator brush; Levi W. Stockwell, Cleveland, Ohio, assignor to the Cleveland Electric Motor Company, same place.

337,896 Dynamo-electric machine; Charles J. Van Depoele, Chicago, Ill., assignor of one half to to Richard H. Mather, Windsor, Conn.

337,897 Electro-magnetic reciprocating engine; Chas. J. Van Depoele, Chicago, Ill.

337,899 Carbon for incandescent lamps; Charles J. Van Depoele, Chicago, Ill.

337,923 Incandescent electric lighting apparatus; Harold P. Brown, Chicago, Ill.

337,931 Electric magnetic motor; Wm. H. Darling, New York. N. Y., assignor of one-half to Gardner P. Harrington, same place.

337,972 Telephone mouthpiece; James Miller, Detroit, Mich.

338,009 Electrical vote-recording and indicating apparatus; Charles O. Yale, Rome, N. Y., and Geo. F. W. Holman and William J. Barnette, U. S. Navy; said Holman assignor to said Barnette.

338,022 Electric railway; Edward M. Bentley, Brooklyn, N. Y.

338,023 Electric motor; Edward M. Bentley, Brooklyn, N. Y.

338,080 Electric railway; Walter H. Knight, New York, N. Y.

338,081 Electric railway; Walter H. Knight, New York, N. Y.

338,082 Electric railroad; Walter H. Knight, New York, N. Y.

338,083 Electric railway; Walter H. Knight, New York, N. Y.

338,084 Safety catch for electrical translating devices; Walter H. Knight, New York, N. Y.

338,085 Electric motor; Walter H. Knight, New York, N. Y.

338,090 Electrical thermostat; Mahlon Loomis, Terra Alta, W. Va.

338,115 Metallic pole for use as a telegraph pole; Samuel H. Terry, Brooklyn, N. Y.

338,120 Volt-ampere meter; Leonard Waldo, New Haven, Conn., assignor to L. G. Tillotson & Co., New York, N. Y.

338,122 Electric arc lamp; Richard Walther and Hugo Walther, Werdan, Saxony, Germany.

338,150 Electric cash and parcel car; George F. Green, Kalamazoo, Mich., assignor to himself, Oliver S. Kelley, and Sol J. Houck, Springfield, Ohio.

338,169 Dynamo-electric machine; Geo. Forbes, London, County of Middlesex, England.

338,174 Electric railway; Walter H. Knight, Cleveland, Ohio.

338,175 Electric railway; Walter H. Knight, Cleveland, Ohio.

338,178 Galvanometer; O. Emil Lundstedt, Brooklyn, N. Y.

338,194 Galvanic battery; James Serson, Boston, Mass., assignor of one-half to Wm. Walsh, same place.

338,197 Oiler and wiper for commutators; Jacob Snowberger, Akron, Ohio, assignor of three-fourths to Orlando Case, U. Grant Kirn, and Louis A. Smith, all of same place.

338,206 Automatic cut-out for electric lamps; Elihu Thomson, and Edwin W. Rice, Jr., Lynn, Mass., assignors to the Thomson-Houston Electric Company, of Connecticut.

WHEN WRITING for Catalogues & ordering Articles advertised in our columns please mention that you saw the advertisment in the ELECTRICAL REVIEW.

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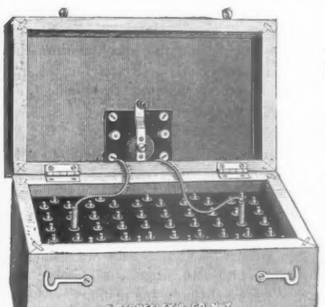

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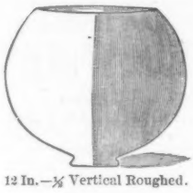

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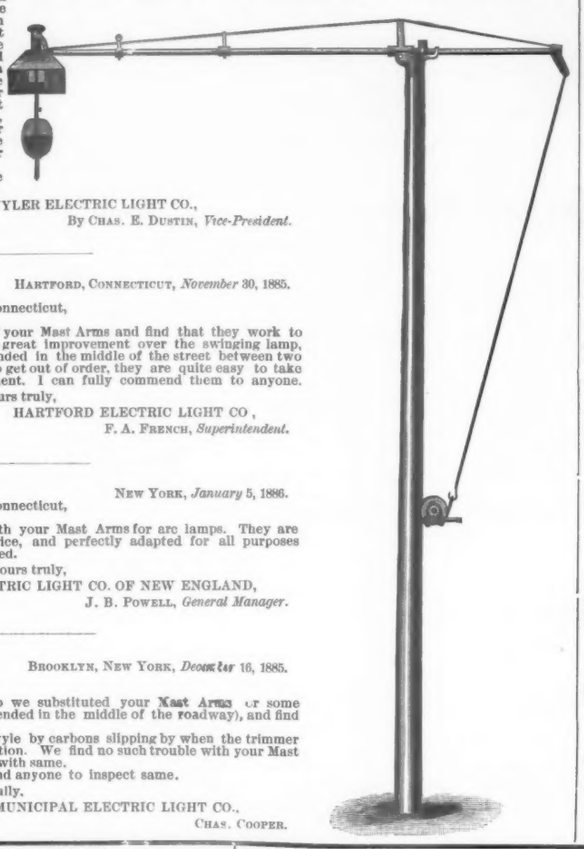
SCHUYLER ELECTRIC LIGHT CO.,
By CHAS. E. DUSTIN, *Vice-President.*



HARTFORD, CONNECTICUT, *November* 30, 1885.

T. H. BRADY, Esq., New Britain, Connecticut,

Dear Sir.—I have used several of your Mast Arms and find that they work to perfection and also that they are a great improvement over the swinging lamp, or, in other words, a lamp suspended in the middle of the street between two poles. They are much less liable to get out of order, they are quite easy to take care of, and are quite an ornament. I can fully commend them to anyone.

Yours truly,
HARTFORD ELECTRIC LIGHT CO.,
F. A. FRENCH, *Superintendent.*

NEW YORK, *January* 5, 1886.

T. H. BRADY, Esq., New Britain, Connecticut,

Dear Sir—I am much pleased with your Mast Arms for arc lamps. They are simple in construction, low in price, and perfectly adapted for all purposes where projecting lamps are required.

Yours truly,
THE BRUSH-SWAN ELECTRIC LIGHT CO. OF NEW ENGLAND,
J. B. POWELL, *General Manager.*

BROOKLYN, NEW YORK, *December* 16, 1885.

MR. THOS. H. BRADY,

Dear Sir.—Some few months ago we substituted your **Xast Arms** for some swinging lamps (i. e., lamps suspended in the middle of the roadway), and find them a vast improvement.

We were troubled with the old style by carbons slipping by when the trimmer was pulling lamp out to its position. We find no such trouble with your Mast Arms, and are very much pleased with same.

Should be pleased to have you send anyone to inspect same.

Respectfully,
MUNICIPAL ELECTRIC LIGHT CO.,
CHAS. COOPER.

Eugene F. Phillips, President. W. H. Sawyer, Sec. & Electrician.

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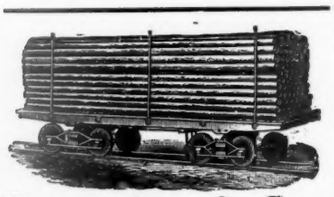

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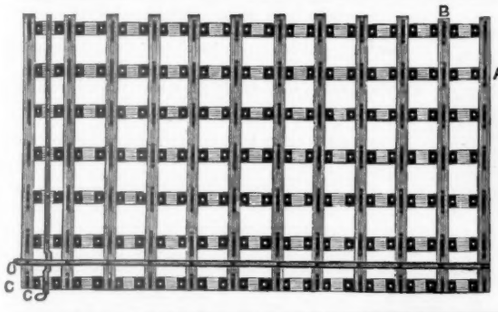

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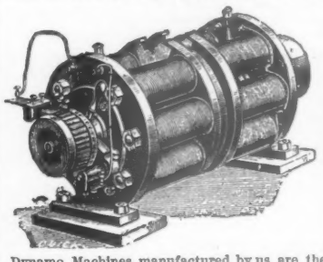

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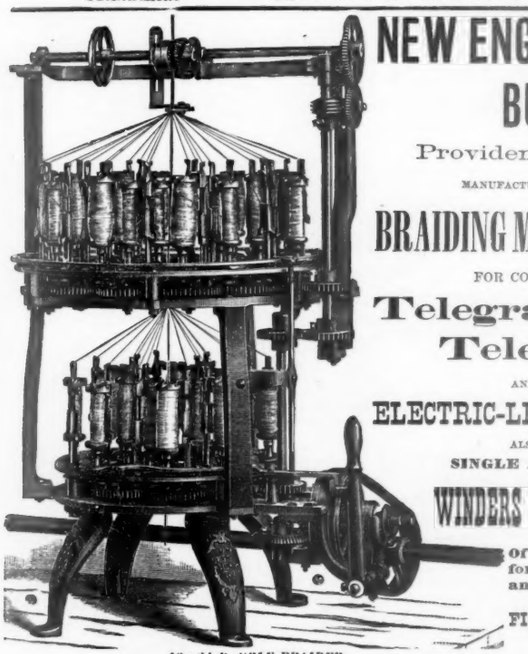

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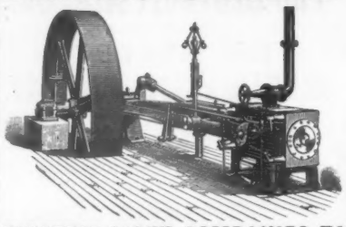

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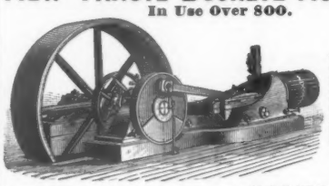

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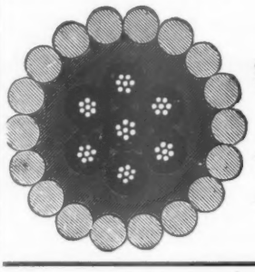

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SAWYER—MAN
vs.
EDISON.

EXECUTIVE OFFICES, MUTUAL LIFE BUILDING,
32 Nassau Street, New York,
March 23d, 1886.

The Consolidated Electric Light Company is the owner of the Sawyer-Man patents. These patents were issued in 1878, 1879 and 1880, except one of them, which was issued on the 12th of May, 1885, after a contest of five years in the Patent Office with Mr. Thomas A. Edison; referring to the subject matter involved, in which contest

MR. EDISON TESTIFIED IN 1883,

"*My mind was full of the fact that they were endeavoring to deprive me of the use of a filament of carbon;*" and referring to the magnitude of the interests involved, the distinguished

COUNSEL FOR MR. EDISON ARGUED

before the Commissioner of Patents in 1885,

"*The case at bar is one of the most important that has ever been before the tribunal of the Patent office. The pecuniary interests at stake are very great, and legal questions of much importance involved. It has been at issue since 1880, and thousands of folios of testimony taken.*"

The decision was that

"SAWYER & MAN

had the invention in a rude form as early as

MARCH, 1878,

and completed in September or October of the same year;" and that

"EDISON

completed the invention and reduced it to practice on or about

OCTOBER 22d, 1879,"

and a patent was issued to Sawyer & Man for the incandescent conductor for an electric lamp, consisting of carbon, made from a fibrous or textile material, having the form of an arch or loop.

Upon these patents of 1878, 1879, 1880 and 1885 suits are pending against leading electric light companies for infringement.

The Edison Electric Light Co. has advertised that it is the owner of the incandescent electric lamp, and has sent threatening letters to users of the Sawyer-Man system.

This Company, while declining to engage in such warfare, deems it proper to state that the Edison Company has never succeeded in obtaining a decree for the infringement of any of their said patents against any person or corporation:

First. Because the patents upon which the Edison Company has based its threats are for inventions proved, in so far as they are new and useful, to have been made by Sawyer and Man prior to October, 1878, for which patents, as above recited, were issued to them.

Second. Because the patents upon which the Edison Company based such threats, which could have had any possible value, were taken out in certain foreign countries for a short term prior to their issue in this country, which term has ended, and the patents have therefore expired.

This Company deems it proper further to state:

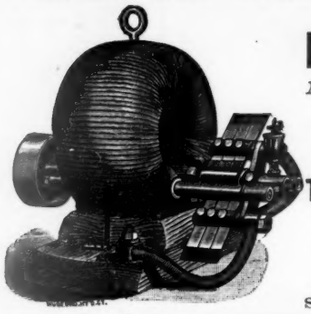
Third. That the Consolidated Electric Light Company will protect all the users of the Sawyer-Man system in the full enjoyment of its privileges.

Fourth. That the controversy in the Patent Office established Sawyer & Man's priority as inventors, and the suits pending in the Courts will determine Edison's liability as an infringer.

Fifth. That this Company requests those using and those contemplating the use of incandescent electric lights, who have been or may be deterred from purchasing lamps of the Sawyer-Man system, by reason of the threats of the Edison Company, to communicate the fact to this office.

THE CONSOLIDATED ELECTRIC LIGHT CO.

THE MATHER DYNAMO-ELECTRIC MACHINE.



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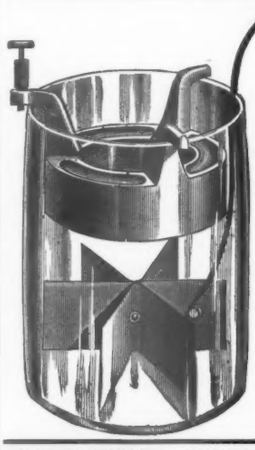

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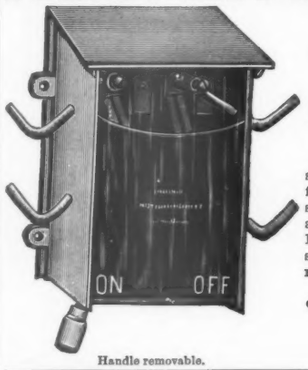

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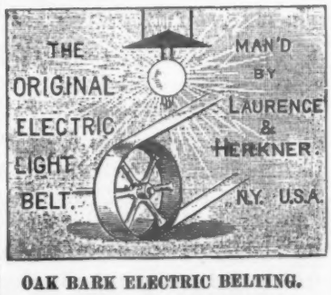

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